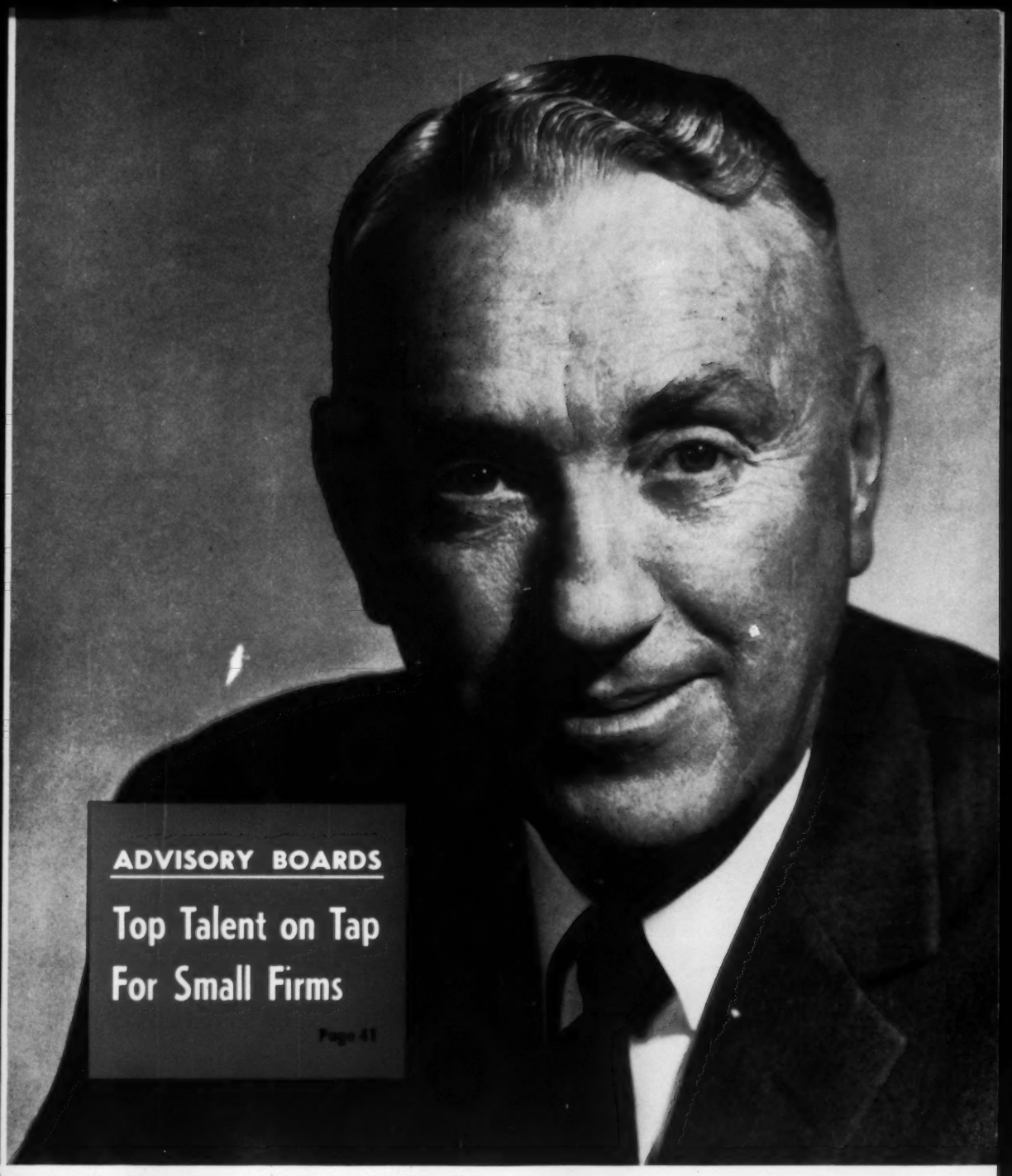
STEEL
The Metalworking Weekly
A PENTON PUBLICATION
MARCH 6, 1961



ADVISORY BOARDS

Top Talent on Tap For Small Firms

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Louis E. Newman, president, Smithcraft Corp.

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TOOL-TIP GEOMETRY...

Elliptical or true Radius?

by Bruno A. Holmstrom
Chief Tool Engineer
The Heald Machine Company

To view this subject in its proper perspective, it is important to remember that no matter how large, complex or costly a boring or turning machine may be, it's the *tool tip* that does the work of removing metal. And on the proper geometry of this small but all-important part depends the success or failure of the entire machining operation.

One of the essentials of good tool design is the correct clearance angle between the work and tool at point of contact.

When finish cutting straight or tapered bores or O.D.'s, a varying clearance angle may be used, as all cutting is done with the outer tip of the tool where this angle is at the maximum. Here a conventional elliptical-point tool, where the clearance angle decreases on either side of the outer tip, is entirely satisfactory. Such tools can be accurately sharpened with an axis of tool reciprocation that is parallel to the face of the grinding wheel, as shown in Fig. 1.

However, when contour boring or turning spherical or irregular shapes, an entirely different situation occurs. Here, the point of contact on the tool tip varies from point to point on the workpiece, as shown in Fig. 2. If a conventional elliptical-point tool were used, the radius and clearance angle would vary from point to point on the work contour and optimum tool geometry would occur only at one of these locations.

For contour work, it is therefore preferable to use a true-radius tool tip—in which the clearance angle and radius is the same for any point on the cutting edge. To generate such a tip, the axis of tool reciprocation must be tilted with respect to the face of the grinding wheel, and this angle then becomes the constant clearance angle of the tool. This is shown in Fig. 3.

To permit grinding either *true-radius* or *elliptical-point* tools with maximum precision and economy, we developed the Heald Model 4 Tool Sharpening Machine. It is the *only* machine of its type which offers this choice of tool-tip geometry while providing fully automatic tool reciprocation for uniform and repetitive tool tip accuracy.

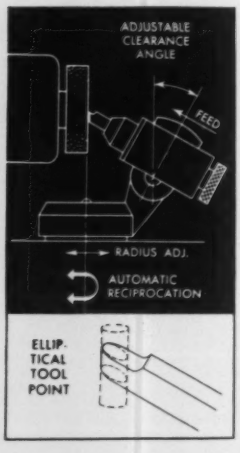

FIG. 1. Elliptical tool point with decreasing clearance angle for conventional straight-line work. Upper sketch shows arrangement of tool sharpening machine.

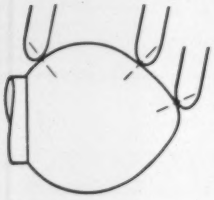

FIG. 2. Sketch showing how contact point of tool varies for different points on a contoured workpiece.

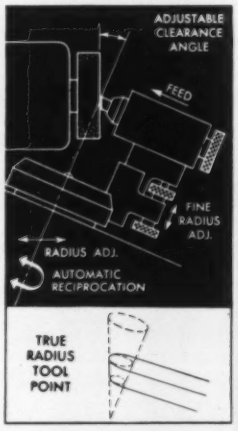

FIG. 3. True-radius tool point with constant clearance angle for contour boring or turning. Upper sketch shows tool sharpening arrangement.

FIG. 4. Heald Model 4 Tool Sharpening Machine arranged for precision grinding of true-radius tool point.

Ask your Heald representative for complete information on the Model 4 Tool Sharpening Machine, or send for Bulletin 2-4-3. **It PAYS to come to Heald.**

THE HEALD MACHINE COMPANY
Subsidiary of The Cincinnati Milling Machine Co.
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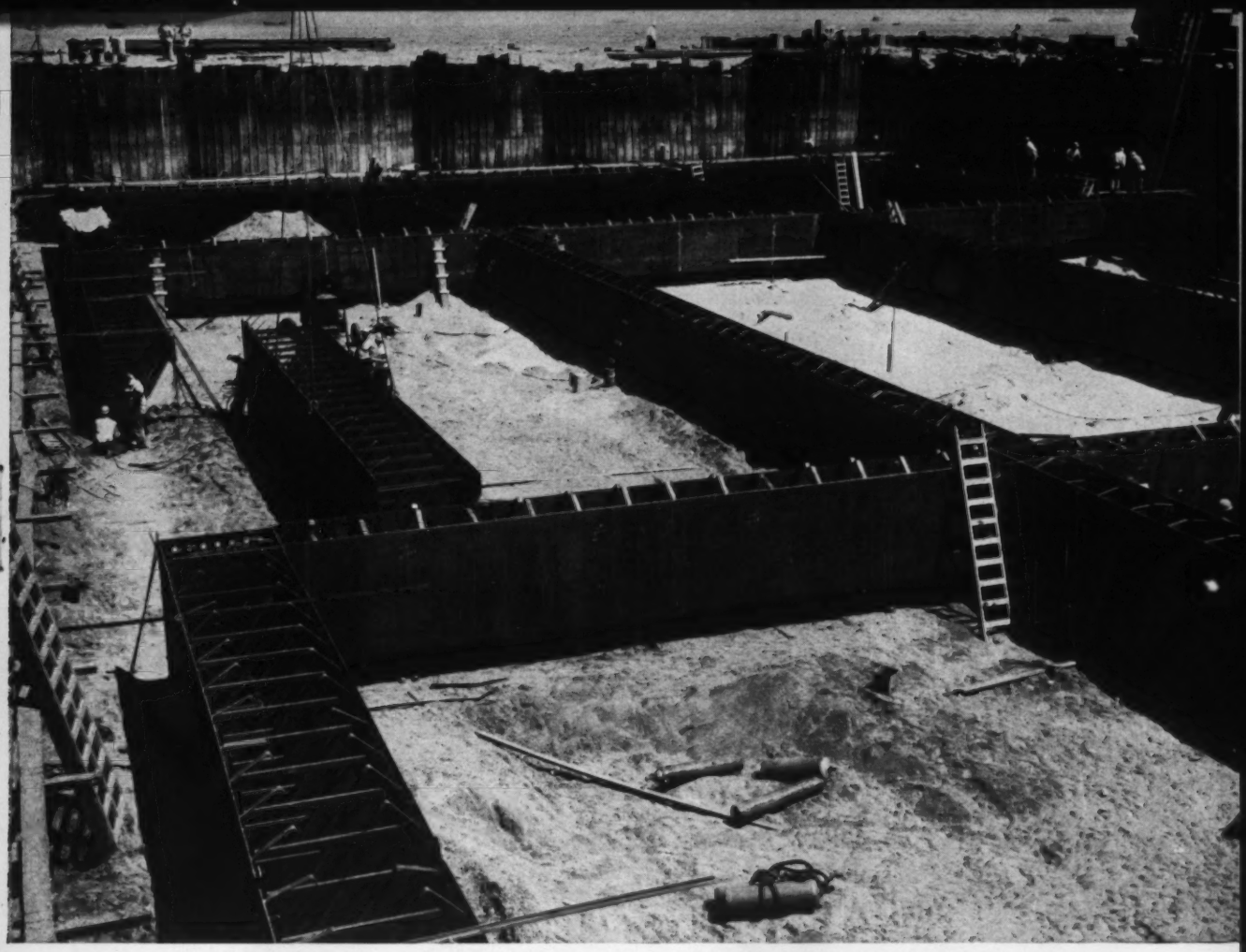

Cutting edge assembly on the job site covers nearly 30,000 sq ft. The Verrazano-Narrows Bridge is being built by Triborough Bridge and Tunnel Authority. Ammann & Whitney are the consulting engineers. Steers-Snare is general contractor.

Cutting edges for huge caisson fabricated from Bethlehem manganese-vanadium plate (ASTM A 441)

Bethlehem plates of manganese-vanadium steel—a high strength, low-alloy grade which meets the requirements of the new ASTM Specification A441-60T—were used in fabricating the caisson cutting edges for the foundations of the Verrazano-Narrows Bridge tower piers. Bethlehem manganese-vanadium was an economical choice because of its good welding qualities and the saving in weight due to its high strength.

The cutting edge assemblies, each of which covers nearly 30,000 sq ft, were pre-fabricated by Elizabeth Iron Works, Elizabeth, N. J. Each contains 28 sub-assemblies, and assembly on the job site required about 11 miles of welding.

Bethlehem manganese-vanadium steel plates were fabricated by Elizabeth Iron Works.

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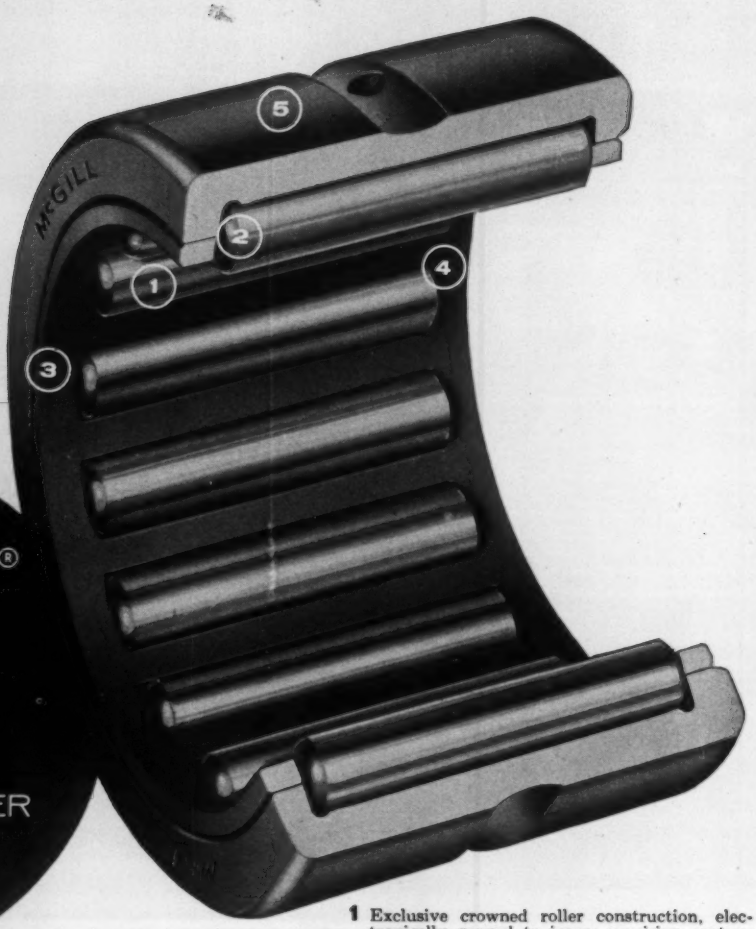

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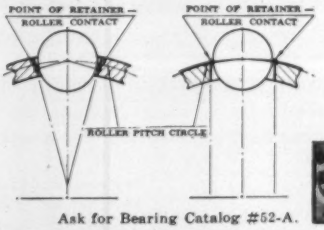
1 Exclusive crowned roller construction, electronically gauged to insure precision contour and size uniformity. Relieved ends assure even load distribution.

2 Flat ends fully engage integral race shoulders, provide maximum support.

3 Proper guidance assured by tapered retainer pockets. The design insures *balanced* roller support and eliminates corner wear from edge loading of straight pockets where retainer OD and pitch circle are coincident.

4 Simultaneously punched pockets assure accuracy of race and roller alignment. The black ferrous oxide retainer finish absorbs and retains lubrication, reducing the friction coefficient.

5 SAE 52100 steel outer race has optimum hardness and surface finish.



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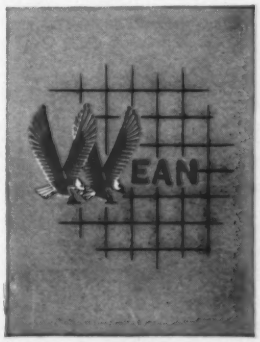
Weirton Steel installs Wean Trimming Line for more efficient tinplate operation

Weirton Steel Company Division of National Steel Corporation recently installed this new Wean side trimming line to increase efficiency in its tinning operations. After the plate has been tempered to customer specifications, it is moved to the Wean tension-type line for final trimming. This advance preparation of coils provides larger, evenly wound coils for the electrolytic tinning line.

The Wean side trimming line has a maximum speed of 4,000 feet per minute and is able to handle 60,000 pound coils 18 to 45 inches wide. Inside diameter of the coils is 16½ inches; maximum outside diameter is 85 inches. Many new design features are incorporated to side-trim coil to accurate widths at high speed.

To improve the efficiency of your tinplate production, call upon a Wean representative to help you plan your requirements. Wean's "creative engineering" has played a vital role in the development of over 75% of the continuous tinplate processing lines in operation today.



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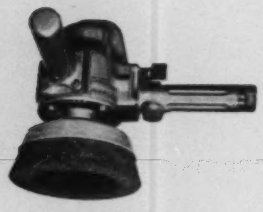
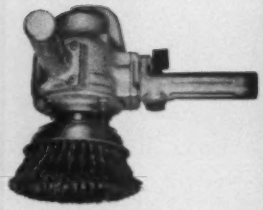


Vertical Grinders



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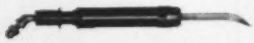

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Scalers

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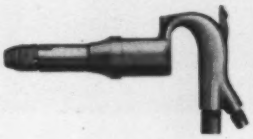
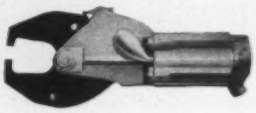


Riveters



Squeeze Riveters

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Clay Diggers

The tools pictured above are only a representation of the hundreds of Cleco Air Tools available.

For detailed information on Cleco's complete line of production-proved air tools and accessories, or for a demonstration-tryout, contact your local Cleco representative or write:

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CLECO
AIR TOOLS

Postman's Holiday

The gentleman pictured here, Carter C. Higgins, is generally associated with Worcester Pressed Steel Co., Worcester, Mass., where he is president. A story on Page 41 discusses his connection with another company. He's a member of Smithcraft Corp.'s (Chelsea, Mass.) outside advisory board. Such groups are being used frequently for advice and counsel on company problems. Mr. Higgins has had a similar setup at his own company for about five years.

Why is he an adviser for Smithcraft? "Cross-fertilization," he says.

News Editor Bill Dean, who handled the article, found that is one of the major benefits of outside advisory boards. Maybe they can help you.

Good Supply

A lady from a forging company in the Los Angeles area tells us:

"My favorite section in STEEL is Men of Industry. All those wonderful, intelligent, successful, handsome men! Now that I'm in the market for a new husband, it would help immensely if you could specify the status of each one—whether married or single. Thank you for any consideration given to this request. I have the utmost confidence in the ability of our men in the steel industry to produce."

Alas, Poor Yorick

Don Bailer of Aerojet-General Corp.'s public relations department writes:

"Ham is the new star of the monkey kingdom; no question about that. When he made his 155 mile high trip in a Mercury capsule, they hung a star on his cage and darned near vice versa.

"But as Ham basks today in the scientific spotlight, with his name up in lights on the marquee of the space frontier, somewhere in the zoological world broods an earlier star of simian spacemanship.

"His stardom came in 1951 when he soared 80 miles up in an Aerojet-General Aerobee rocket, and came back, monkeydom's first successful round trip. Aerojet personnel called him Yorick.

"And, today, nitpicking around a zoo somewhere like a fading ex-matinee idol, scraping for peanuts with the rest of the pack, poor Yorick, alas, surely must be brooding over the fickleness of fame—and contemplating science's new premium, Ham, on wry terms, with little relish."

In Praise of Conservatism

A Scotch friend claims that the world's most conservative businessmen are the whisky distillers of Glenlivet, and gives us this example:

In one distillery a few years ago, a rope used for hauling sacks of barley to a loft broke after decades of use. A sack fell and injured a man.

After investigating, an official committee of inquiry recommended replacing the rope with a steel chain.

The distillery owner considered, then shook his head. "I can na' do it, mon. It might change the character of ma' whisky."

Sound conservatism has real worth in business, but it can be overdone. The successful U. S. businessman, we believe, is an ideal mixture of progressiveness and conservatism. He's willing to change to new and better products and techniques after they're tried and tested.

Which leads us to say, "Please turn to Page 81 where you'll find described many a tried and tested new and better product."

Public Gets the Royal Soap

While we're on the subject of things British, we'll mention the clipping marked for our attention by Geraldine, our cleaning woman, night editor, and tireless reader of newspapers the editors keep on file.

The item was datelined from Sydney, Australia, and reports an interview with one H. Rossiter, managing director of a firm which has supplied soap to two monarchs. In an interview, he recalled a minor soap sensation in Canberra during the visit of the Queen Mother in 1958. An adequate supply of the Royal soap was not available, and urgent messages were sent to him in Sydney to get some. And where did he find it? In a city store, of course.

"The soap we supply to the Royal household differs in no way from that we supply the general public," he says firmly. It's manufactured from a secret formula developed in 1883. It contains turtle oil, avocado pear oil, and lemon.

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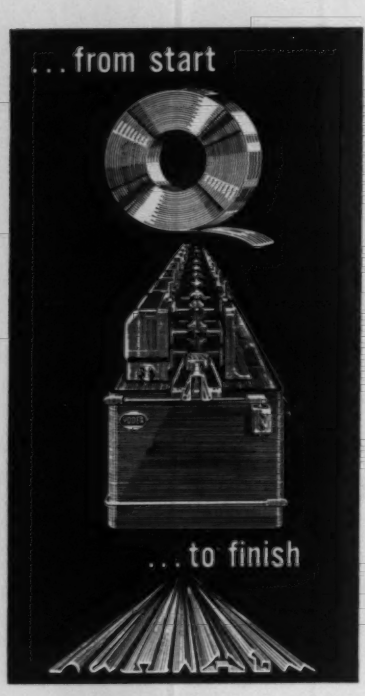

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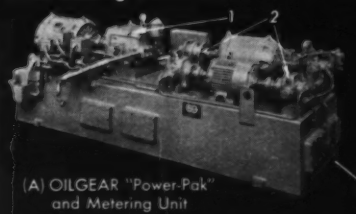
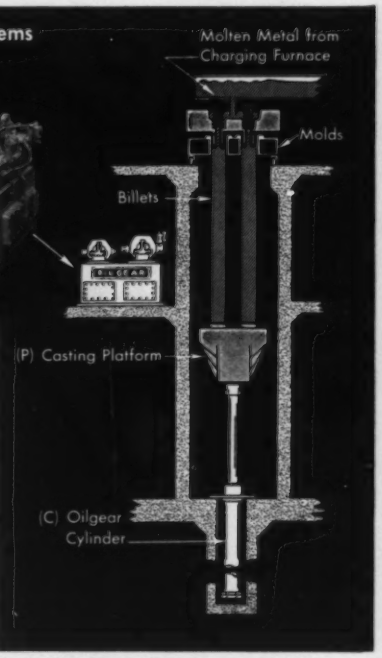
HOW OILGEAR SYSTEMS IN KAISER ALUMINUM PLANTS AID DIRECT CHILL BILLET CASTING PRODUCTION

USER: *Kaiser Aluminum & Chemical Corporation*

PROBLEM: To supply direct chill billet casting platform power and control systems for production of a major portion of the 1,050,000,000 lb of aluminum consumed annually by domestic extruders. Direct chill billet quality — avoidance of internal cracking, homogeneity, grain structure fineness and orientation — depends on a smooth, unvarying, precise platform feed rate, careful control of pouring speed and temperature, cooling rate, and other variables to prevent atmospheric oxidation and impurities. Up to 32 billet logs over 18 ft long are to be produced in a single cast. POWER AND CONTROL SYSTEM REQUIREMENTS: 1. Remote pushbutton control of all functions. 2. Rapid platform traverse up and down. 3. Infinite "down" feed rate selection — unvarying regardless of casting platform load increase; chatter-free — unaffected by off-balance platform loads. 4. "Fail-safe" — insuring completion of a cast in event of power failure. 5. Must be simple, and assure long, trouble-free, dependable service.

Application-Engineered Fluid Power Systems For Direct Chill Casting Stations





HOW IT WORKS: The Oilgear Variable Displacement Pump (1) on "Power-Pak" (A) provides adjustable preset slow and fast speeds for raising and lowering casting platform (P). Oilgear Variable Displacement Piston-type Precision Metering Pumps (2) are connected in series hydraulically between Oilgear Cylinder (C) and "Power-Pak" (A) Reservoir. Ram down-feed during casting is dependent upon control setting of the Secondary Metering Pump — remotely pushbutton-controlled to provide instant, precise, feed rate adjustment ... indicated in ipm on a direct reading indicator. Oil, increasing in pressure as the billet load increases, flows from Cylinder (C) through sealed, "pressurized," Primary Metering Pump — and then, at relatively constant low pressure, through the Secondary Metering Pump to "Power-Pak" (A) Reservoir — providing an extremely accurate casting feed rate regardless of varying platform load. An automatic, Oilgear hydraulic control varies Primary Metering Pump displacement to compensate for load variation and feed rate selected. "Fail-safe" operation is provided through Oilgear Valves.

Above: Rapid traverse is used to raise the casting platform, bringing, in this case, the 6-in.-sq. by 18-ft billet logs out of the casting pit for identification with cast number at one of three direct chill casting stations at Kaiser Aluminum's Chalmette, La., Works. Direct chill "molds" are clearly visible behind the "marker."

SOLUTION: Oilgear's patented Feed and Control System provides accurate volumetric metering of pressurized oil over a 200:1 pressure range, and a 100:1 feed range. Installations consist of an Oilgear Variable Displacement Pump direct-connected to an electric drive motor, two Oilgear Precision Variable Displacement Metering Pumps direct-connected to a double-end synchronous electric motor — all mounted on a custom-built reservoir base (A); and Oilgear piston- and ram-guided, chatter-free, *Custom-Quality* Cylinder (C); Oilgear Valves and Controls ... all thoroughly, carefully *Application-Engineered.*

USER REPORTS — "Where accumulating load on the platform varied oil pressure from 50 to 1500 psi, and the rate of metering was preset anywhere from 50 to max. cipm, *there was no measurable change on the preset rate of casting feed during any portion of the stroke.*"

There has been NO major maintenance on these heavy-duty Oilgear Systems operating continuously in Kaiser Aluminum plants across the nation — some for over 7 years — and still "going strong."

THIS PATENTED OILGEAR METHOD of precise metering — and other accurate Oilgear Control Systems — have been applied to a wide range of applications in many industries where varying loads must not affect the speed of linear movement or hydraulic motor rotation. Carefully Application-Engineered Oilgear Systems — also used extensively on extrusion presses ... aluminum foil laminating machines ... stretching, forming, drawing and spinning presses ... can-closing and filling machines ... metal briquetting presses ... ladle tilting, ingot manipulators, strippers, and scalpers — have all proved Oilgear equipment's traditionally long life, prompting users to state —

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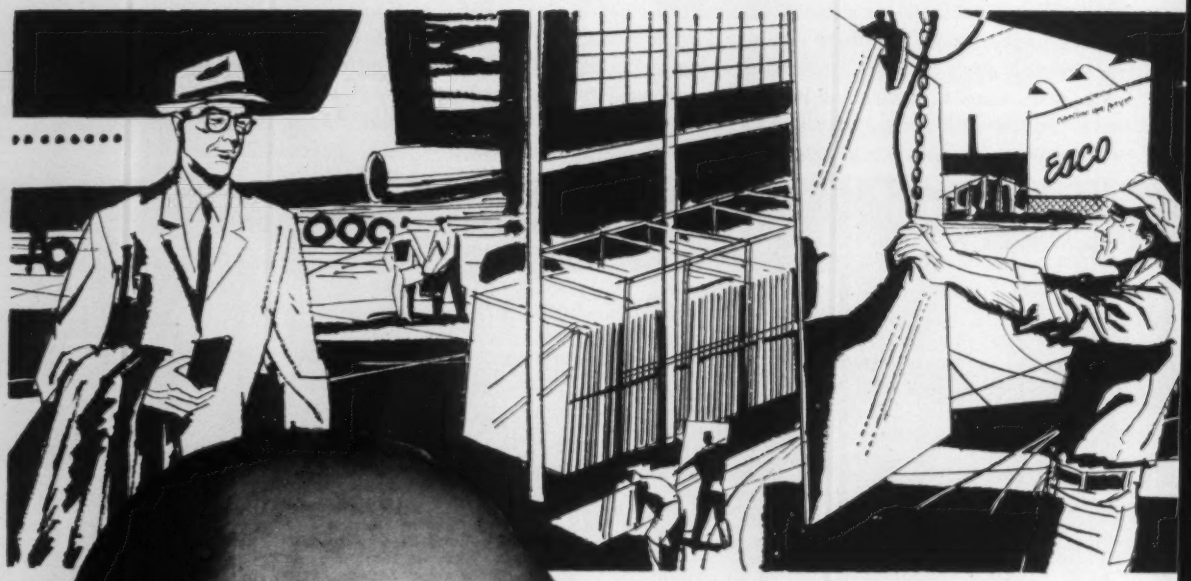
Bill deWeese and his



As VP in charge of Sales and Metallurgy of the ESCO Corporation of Portland, Oregon, Bill deWeese wears two hats and specializes in cutting red tape. ESCO is one of the largest warehousers of Stainless Steel in the West. Bill deWeese explains ESCO's business philosophy like this: "We're a supermarket, providing Stainless Steel service from Alaska to the Mexican border, from Hawaii to the Kansas state line. Our widespread steel service centers make it possible for us to supply orders without delay to almost any part of the country. We're specialists in Stainless Steel service and, by ordering through us, customers eliminate red tape and wasted motion trying to track down material they need."

ESCO is actually three enterprises in one —a manufacturer, a jobbing foundry and a

Stainless Steel supermarket

steel distributor. They distribute Stainless and alloy steels only. Seven ESCO warehouses (including one in Honolulu) stock a complete selection of Stainless Steel rolling mill products—sheet, plate, bar, wire, valves, pipe and tubing. In addition, ESCO produces their own brand of high alloy and Stainless Steel castings.

Bill deWeese isn't just an "inside man." He spends a great deal of his time personally contacting ESCO's many customers, from Honolulu to Denver, backing up ESCO's reputation for fine service. As an example of that service, here's how ESCO solved a difficult order problem for one of their oldest customers. This customer fabricates assemblies for many industries in the Pacific Northwest. Recently they received an order from a large pulp mill for processing equipment. It was to serve as a liquor cleansing unit. Because of the powerful oxidizing properties of the chemicals in pulp as it comes from the digester, Stainless Steel was required. On short notice the order moved out of inventory and was delivered on time to the fabricator.

Men like Bill deWeese, and companies like ESCO, daily do outstanding jobs in delivering Stainless Steel from steel service centers all over the country. Fabricators and manufacturers have come to depend on this reliable service, just as they rely on Stainless Steel as the ideal material where outstanding corrosion resistance, ease of fabrication, strength and heat resistance are needed. If you want unmatched efficiency, durability and ultimate economy, be sure to specify USS Stainless Steel. *USS is a registered trademark*

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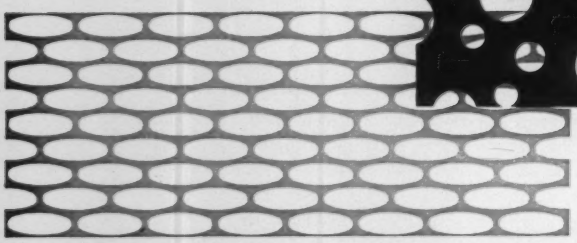

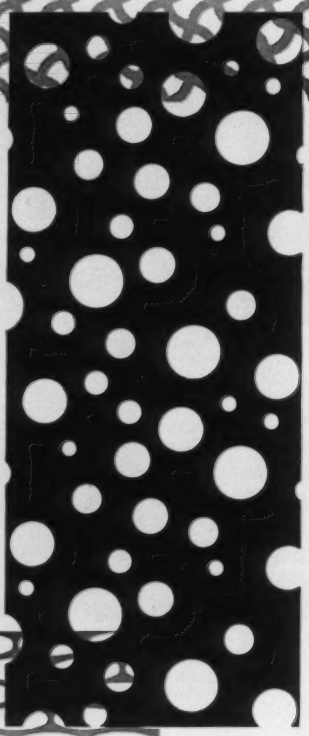

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CALENDAR
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Mar. 23-25, American Machine Tool Distributors' Association: Spring meeting, Hotel Mark Hopkins, San Francisco. Association's address: 1500 Massachusetts Ave. N.W., Washington 5, D. C. General manager: James C. Kelley.

Apr. 4-7, Society of Automotive Engineers: National aeronautic meeting and display, Hotel Commodore, New York. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: Joseph Gilbert.

Apr. 6-7, American Society of Mechanical Engineers: Management engineering conference (ASME-SAM), Statler-Hilton Hotel, New York. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

Apr. 9-15, National Association of Architectural Metal Manufacturers: Annual convention, Plaza Hotel, New York. Association's address: 228 N. LaSalle St., Chicago 1, Ill. Executive secretary: William N. Wilson.

Apr. 10-11, American Society of Mechanical Engineers: Maintenance and plant engineering, Bancroft Hotel, Worcester, Mass. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

Apr. 10-12, Metallurgical Society of AIME: National open hearth steel conference and blast furnace, coke oven, and raw materials conference, Sheraton Hotel, Philadelphia. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

Apr. 10-13, American Management Association: National packaging exposition and conference, Lakefront Exposition Hall, Chicago. Association's address: 1515 Broadway, New York 36, N. Y.

Apr. 11-12, American Institute of Electrical Engineers: Biennial conference, Sheraton-Lincoln Hotel, Indianapolis. Institute's address: 33 W. 39th St., New York 18, N. Y.

Apr. 11-13, Steel Shipping Containers Institute Inc.: Annual convention, Kenilworth Hotel, Bal Harbour, Fla. Institute's address: 600 Fifth Ave., New York 20, N. Y. Secretary: L. B. Miller.

Apr. 11-14, Copper & Brass Warehouse Association: Annual meeting, Broadmoor Hotel, Colorado Springs, Colo. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

Apr. 12-14, Metallurgical Society of AIME: International symposium on agglomeration, Sheraton Hotel, Philadelphia. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

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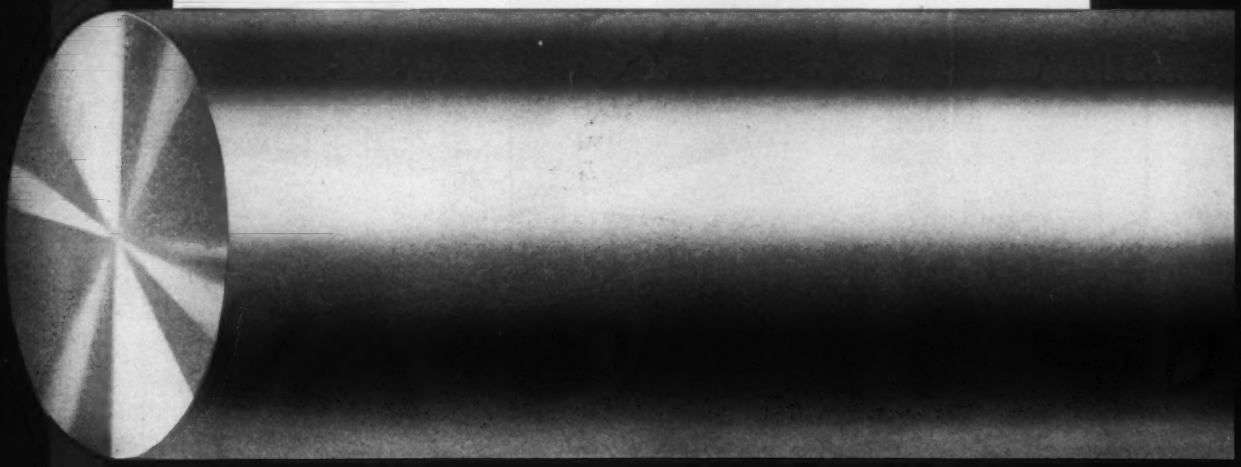

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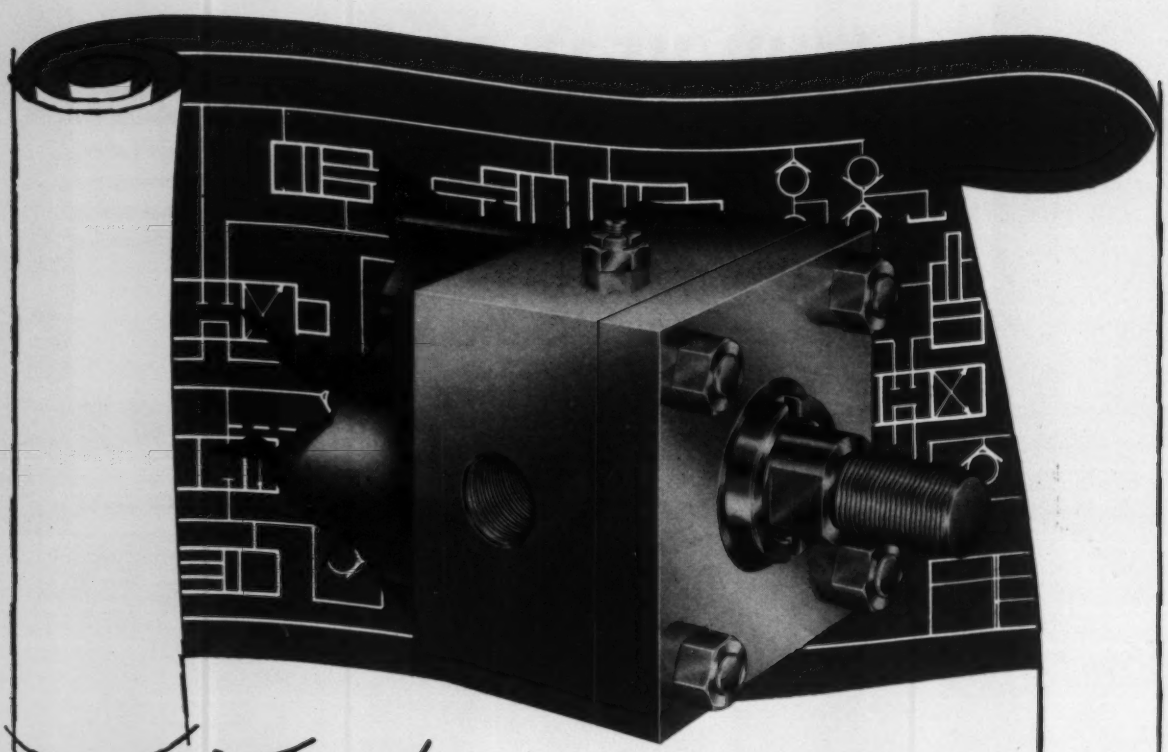

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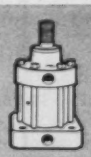

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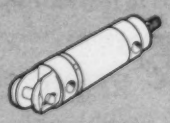

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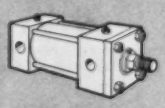

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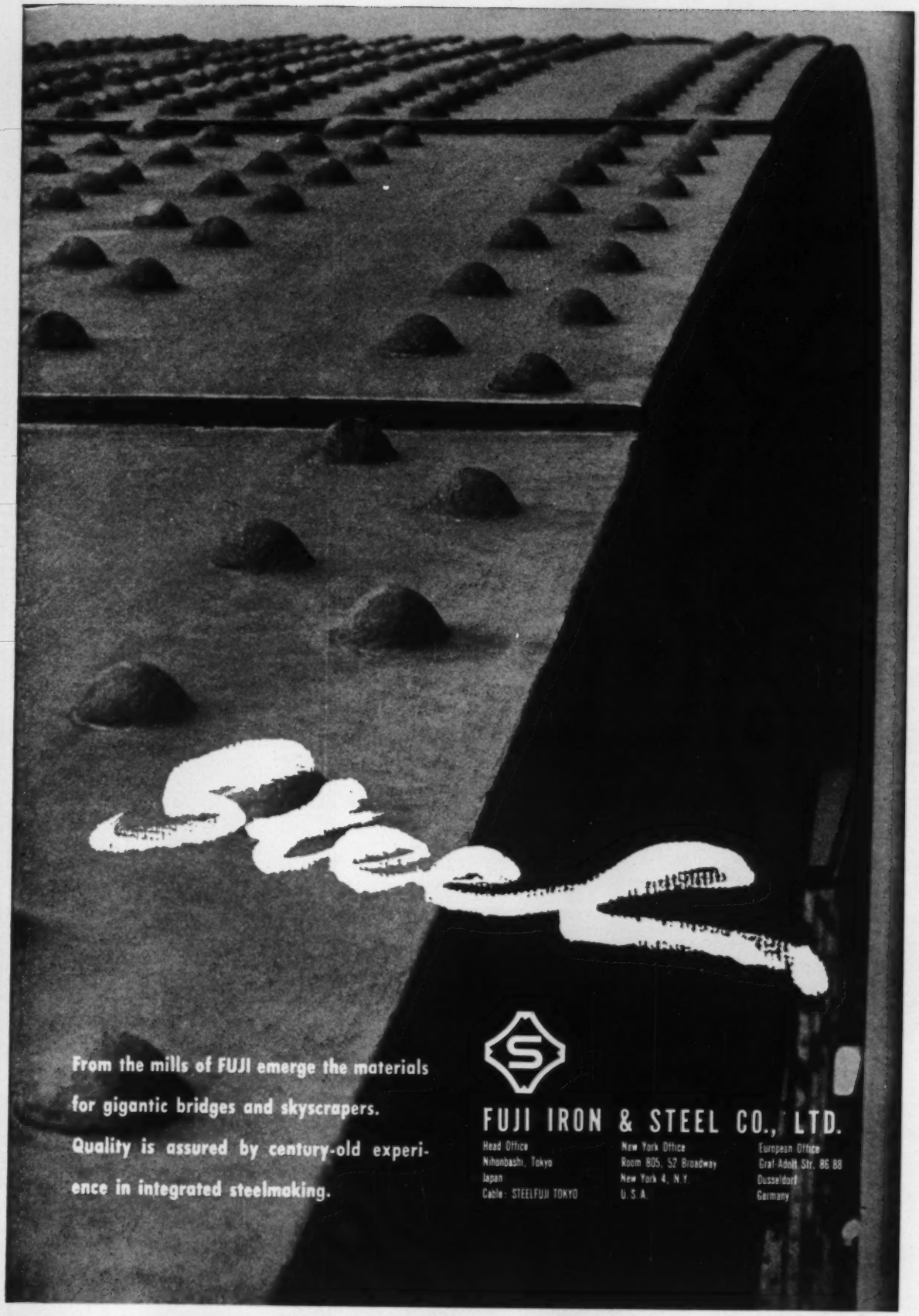
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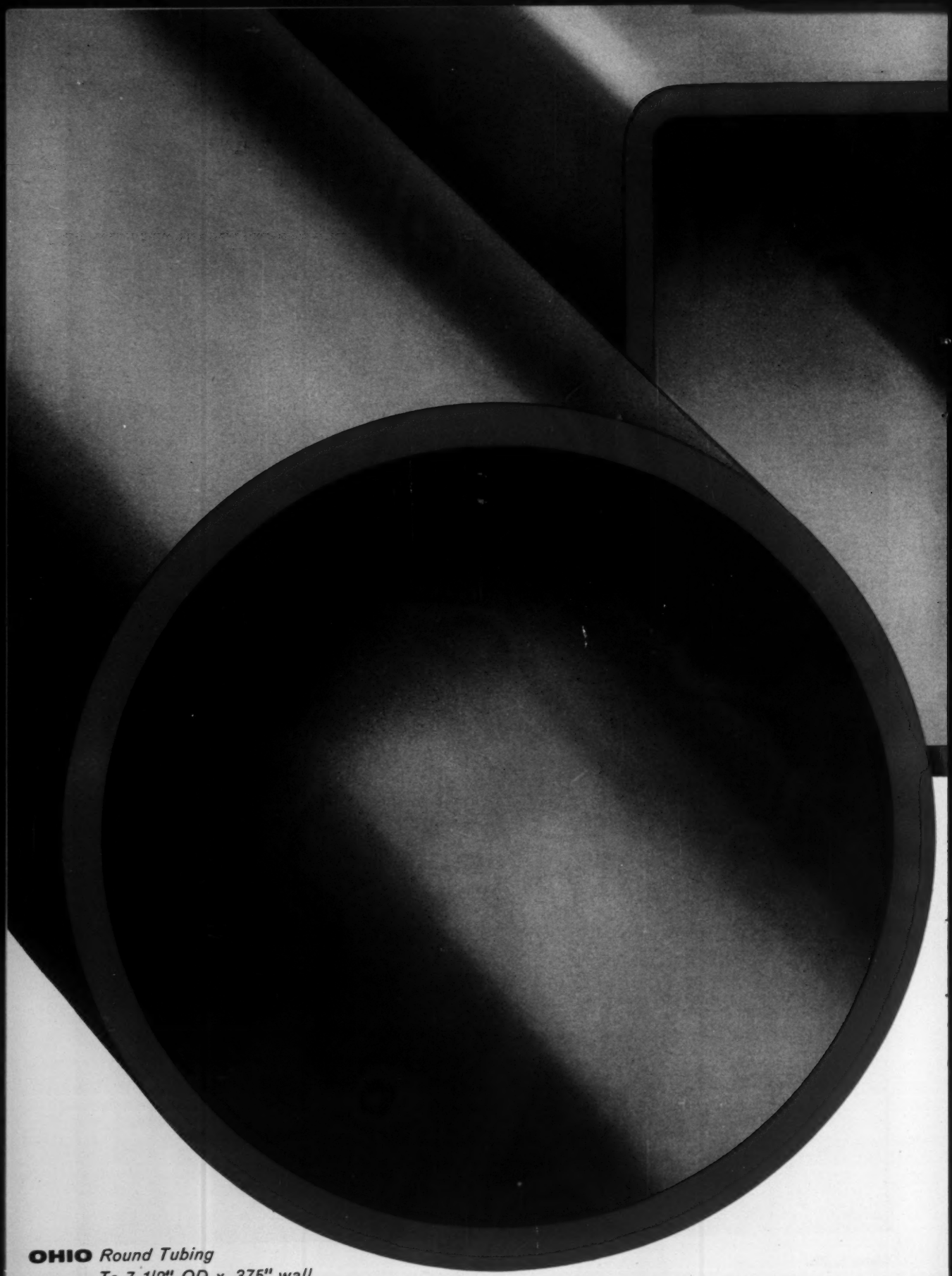

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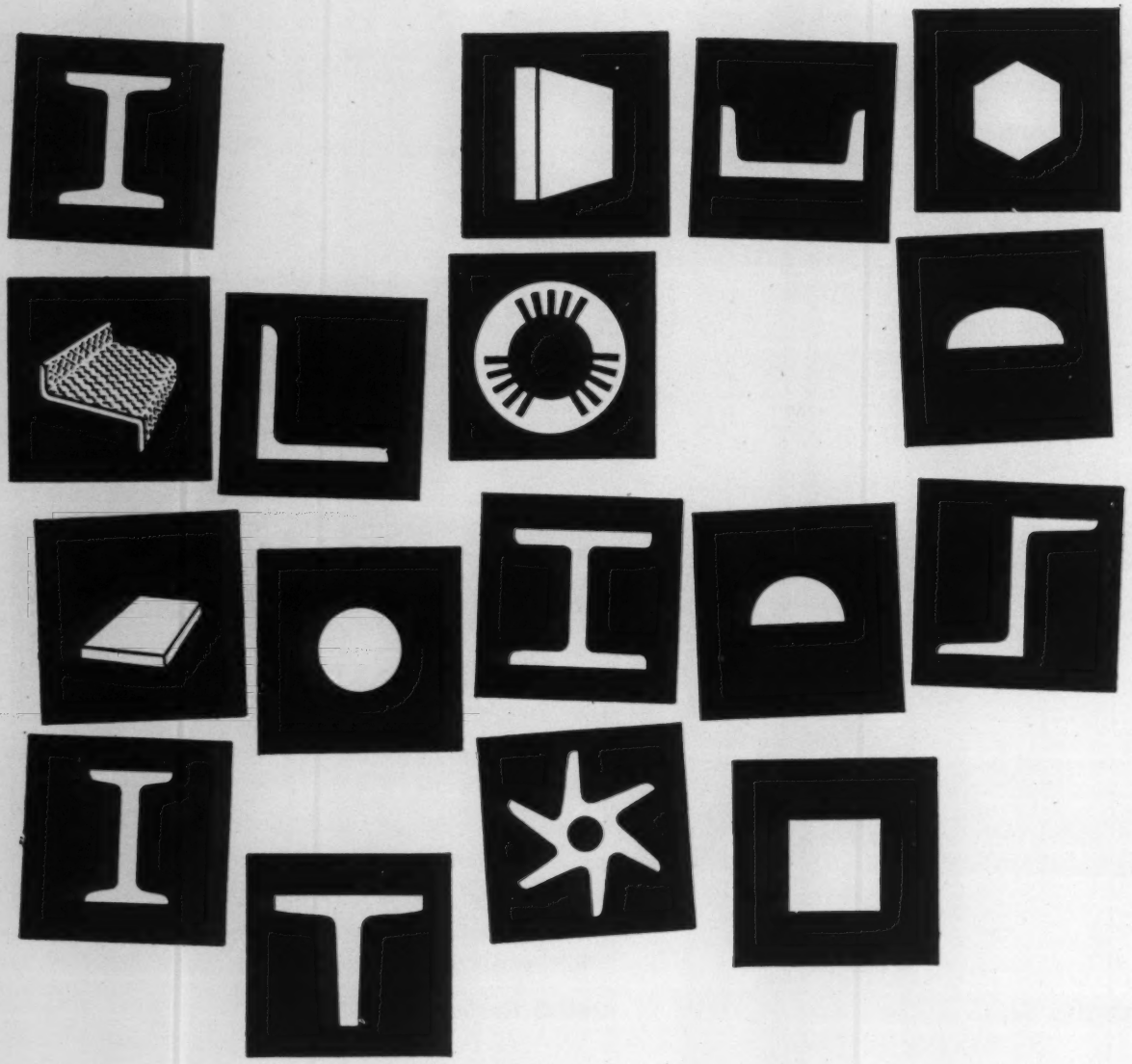

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STEEL
The Metalworking Weekly

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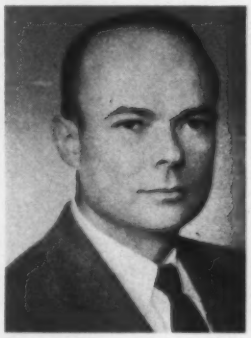
March 6, 1961

Russia Is Stepping Up Steel Mill Productivity

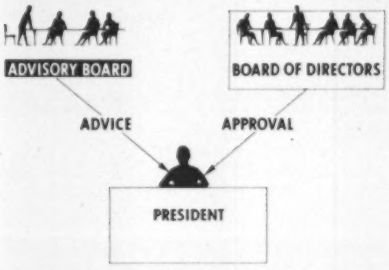


"Soviet engineers acknowledge our leadership in automation systems for iron and steel processes, but practically all of them are convinced that they'll pass us in worker productivity and product quality at some future date," W. E. Miller, manager of General Electric Co.'s steel mill engineering (back from 11 days in Russia) told the Association of Iron & Steel Engineers in Los Angeles last week. He said Communist steel capacity would grow at about twice the rate of Free World capacity for the next five years, but the Free World would continue to produce more tons.

January Figures Bring Hope to Business

A study of the Commerce Department's statistics on manufacturing in January, released last week, will give the businessman a feeling of hope for an early economic uptrend. Manufacturers' inventories, at $53.53 billion (seasonally adjusted) in January, indicate the end of liquidation is near. Only $110 million was shaved off the total during the month, all of it in the durable goods sector. And manufacturers' new orders fell only $290 million in January from the December level. Unfilled orders fell $200 million and stood at $45.17 billion in January.

Top Talent on Tap for Smaller Firms



If you're the president of a small or medium sized firm, take a look at the outside advisory board concept. It's one approach to getting top-notch advice and counsel that many presidents often wish were readily available. On Page 41 you'll find how such boards can be set up and how they operate.

Industry to Campaign Against Slump Psychology

Commerce Secretary Luther Hodges on Mar. 2 announced a multimillion dollar advertising campaign to combat recession psychology. The drive is being kicked off by blue chip companies and will be handled by the Advertising Council. It's patterned after a similar effort launched during the low point of the 1958 recession. Newspaper and magazine ads, radio and TV broadcasts, car cards and outdoor billboards will assert that our economy is basically strong and expansion possibilities are endless. The ads will not

Technical Outlook—Page 63 Market Outlook—Page 93

ignore the recession (the copy speaks of "occasional dips," for example), but they will emphasize the positive and the long term outlook.

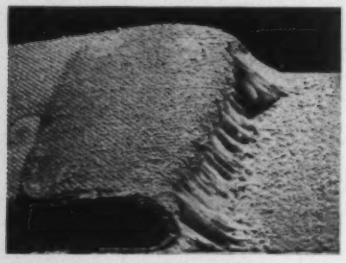
Laser Finds Space Radar Use

Radar using a coherent light beam to detect distant targets has been developed by Hughes Aircraft Co. for use aboard orbiting satellites. It's called Colidar. In the photo, a researcher demonstrates how light from the laser transmitter at the top pulses out to the target, is reflected back, and collected by a mirror in the telescope below. Electronic equipment then processes the signal to provide data such as the distance and angle of the detected target.

Bottom of Recession Reached by Durables?

January new orders for durable goods reported last week by the Commerce Department offer some signs that the recession's bottom may have been reached by now. Here's the rundown on January new orders (seasonally adjusted), and the change from December's: Primary metals: $1.81 billion—up $40 million. Iron and steel: $1.14 billion—up $80 million. Fabricated metal products: $1.51 billion—up $60 million. Electrical machinery: $1.93 billion—no change. Other machinery: $2.65 billion—down $90 million. Transportation equipment: $2.73 billion—down $100 million.

Structural Adhesives Go into More Jobs



Sales of structural adhesives (about $20 million in 1959) will reach an annual volume of $60 million by 1965, predicts Stanford Research Institute. Wider applications are developing in aircraft, automotive components, and other metal assemblies (Page 64). Adhesives also are showing gains from metal-nonmetal combinations (photo).

Hodges Favors More Trade with Russia

Observers in Washington predict a gradual lessening of restrictions on U. S. trade with Iron Curtain countries. The main emphasis will be on administrative action rather than legislative action. For example, Secretary of Commerce Luther Hodges says he will not take any Defense Department requests to stop shipment of "strategic" goods "too seriously" unless Defense makes "a strong appeal."

Gainsbrugh Sees Uptrend

The recession may have reached its low point, Martin R. Gainsbrugh, chief economist of the National Industrial Conference Board told the Pulp Pro-

ducers Association. He cited the high rate of inventory liquidation and the strength of end product demand as factors influencing his outlook. New orders have begun to outstrip current rates of production, he said.

Paxton Retires as GE Prexy

Robert Paxton has retired as president of General Electric Co. because of ill health. (He underwent a major operation in January.) Ralph J. Cordiner, chairman, will assume the presidential duties until a successor can be elected. Mr. Paxton had been with GE 37 years. He became president in 1958. Mr. Cordiner announced, at the same time, that he has resigned as chairman of the Commerce Department's Business Advisory Council, but will remain a member.

Kennedy Asks Tax Hike in Highway Message

If the federal highway program is to be kept on schedule, more taxes from heavy trucks must be poured into the highway trust fund and the current gasoline tax must continue, says President Kennedy. Needed: About $900 million more revenue a year or the program could fall as much as five years behind. Scheduled completion date is 1972.

Ultrasonics Flips the Pictures

Bell & Howell has unveiled a new slide projector that uses ultrasonic waves to focus and change slides on the screen (photo). The remote control device is effective at distances exceeding 40 ft. The unit will give speakers more freedom of movement while they're talking. The unit has two miniature transmitters that vibrate to create sound waves in the same manner as a tuning fork. One transmitter controls focusing; the other is for changing slides.

Sign of Upturn in Autos?

The Chicago Automobile Show, which closed Feb. 26, drew a record crowd of 789,734—52 per cent above the previous record. Chicago car dealers report increased traffic in their showrooms and many note pickups in sales of both new and used cars.

Willys Motors Not for Sale

Willys Motors Inc., Toledo, Ohio, is not for sale, S. A. Girard, president, declares. It had been rumored that a merger was pending between Willys and American Motors Corp. Actually, the two firms are discussing a joint engine facility slated for Mexico, where both have assembly plants.

Kennedy Hikes Bicycle Tariff

President Kennedy has raised import duties on bicycles by 50 per cent, in the first move of this type by the new administration. The State Department says the new rates were set in negotiations with the six principal suppliers—West Germany, Great Britain, Netherlands, Belgium, Luxembourg, and

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March 6, 1961 Vol. 148 No. 10

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Editorial Index available semiannually.

STEEL also indexed by Engineering Index, 29 W. 39th St., New York 18, N. Y.

Austria. Under the new rates, import duties will range from $1.27½ to $3.75 per bicycle. The U. S. imports nearly 30 per cent of the dollar volume of bikes sold in this country.

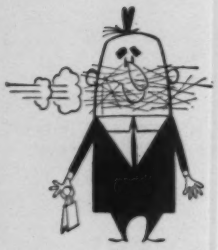
Hoffa Wins; Monitors Are Out

After a three year fight, Teamster Boss James R. Hoffa last week won a court order dissolving the monitor setup and permitting the giant union to call a convention and election for president. Mr. Hoffa immediately called a convention for Miami in mid-May. At the same time, he announced plans for organization drives outside the trucking industry.

Satellite Scoreboard

Do you know how many artificial moons are touring our skies these days? A summary by the National Aeronautics & Space Administration lists 22 U. S. satellites and 5 Russian ships. We have launched 36 into orbit around the earth (20 are still there) and two into solar orbit (both remain). The USSR has launched nine into orbit around the earth (three remain) and two around the sun (both remain).

Straws in the Wind



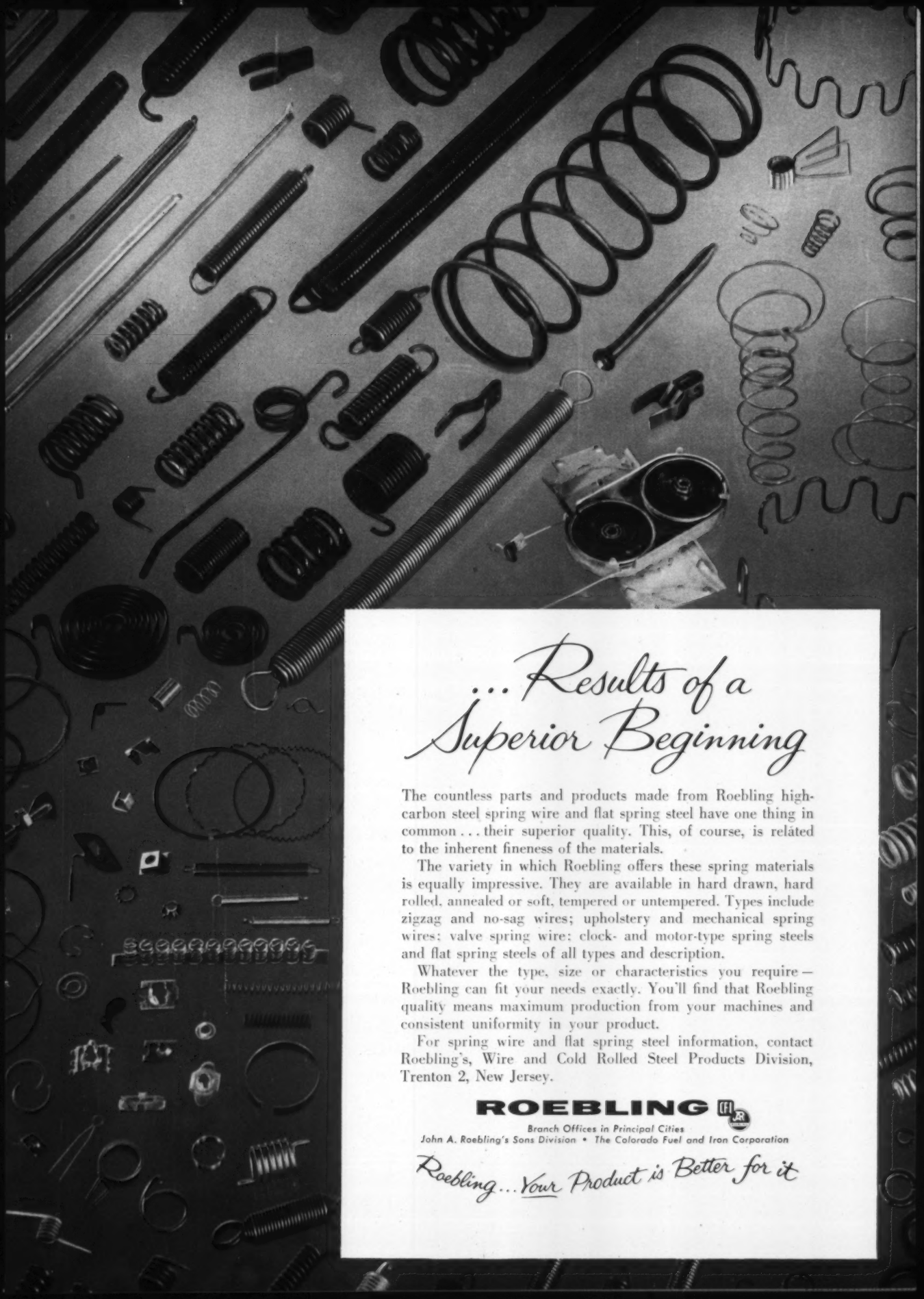
Building contracts awarded in January rose to nearly $2.5 billion—15 per cent above the year-earlier mark and a new record for the month, F. W. Dodge Corp. reports . . . Allegheny Ludlum Steel Corp. has developed a new stainless steel with high corrosion resistance . . . The AFL-CIO plans to invest $1 billion in home mortgage loans . . . Kaiser Aluminum & Chemical Corp. will merge with Kawneer Co., maker of curtain wall panels and other architectural products . . . Aluminum Co. of America predicts that the shipping container industry, which now uses about 7 million lb of aluminum annually, will use 185 million lb annually by 1970 . . . Employment in the computing machine industry has climbed more than 50 per cent in the last five years, the Labor Department reports . . . The Industrial Management Society is accepting entries for its annual methods improvement contest to be held Nov. 1-3 in Chicago's Pick-Congress Hotel. . . . Titanium Metals Corp. of America, jointly owned by Allegheny Ludlum Steel Corp. and National Lead Co., plans a $2 million expansion of its Toronto, Ohio, plant to produce tubing for nonmilitary uses . . . Ex-Cell-O Corp. has been licensed to build and sell machines using the new electrochemical process developed by Steel Improvement & Forge Co. (STEEL, Nov. 7, 1960, p. 110).

Metalworking Pulse

The Business Trend: STEEL's industrial production index rose a point in the week ended Feb. 25. Increases in the steel ingot rate and auto output more than offset a drop in electrical output and a slide in freight carloadings. **Autos:** A slump in sales has prompted Chrysler to shut down all of its operations, cutting the over-all production figure severely. **Steel:** Decline in the ingot rate does not reflect any weakening in over-all demand. Look for the uptrend to resume and accelerate.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49=100)
  Week ended Feb. 25 .... 146†
  Year ago 178
  Details on Page 51
- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended Mar. 4 ... 85,000*
  Year ago 138,513
  Details on Page 48
- **STEEL INGOT OUTPUT (TONS)**
  Week ended Mar. 4 . 1,560,000*
  Week ago 1,582,000
  Details on Page 100

†Preliminary. *Estimated.



... Results of a Superior Beginning

The countless parts and products made from Roebling high-carbon steel spring wire and flat spring steel have one thing in common . . . their superior quality. This, of course, is related to the inherent fineness of the materials.

The variety in which Roebling offers these spring materials is equally impressive. They are available in hard drawn, hard rolled, annealed or soft, tempered or untempered. Types include zigzag and no-sag wires; upholstery and mechanical spring wires; valve spring wire; clock- and motor-type spring steels and flat spring steels of all types and description.

Whatever the type, size or characteristics you require — Roebling can fit your needs exactly. You'll find that Roebling quality means maximum production from your machines and consistent uniformity in your product.

For spring wire and flat spring steel information, contact Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

ROEBLING

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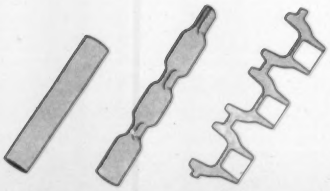
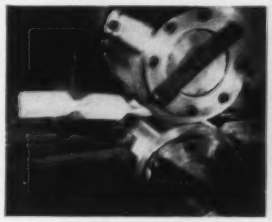
John A. Roebling's Sons Division • The Colorado Fuel and Iron Corporation

Roebling ... Your Product is Better for it

REDUCEROLL + MAXIPRES = Modern Forging!



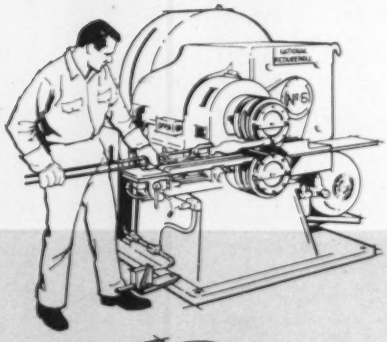


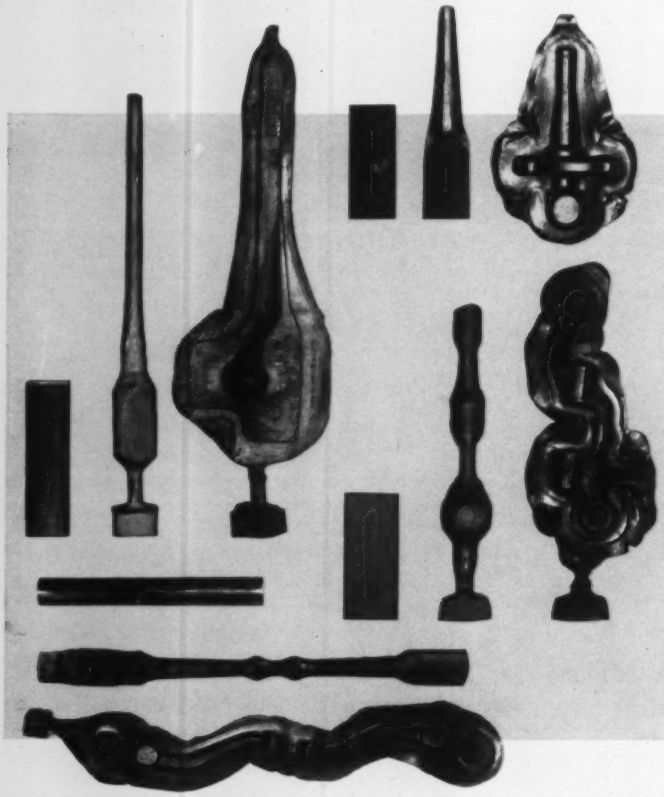
Modern forge plants around the world are using the method shown at right:

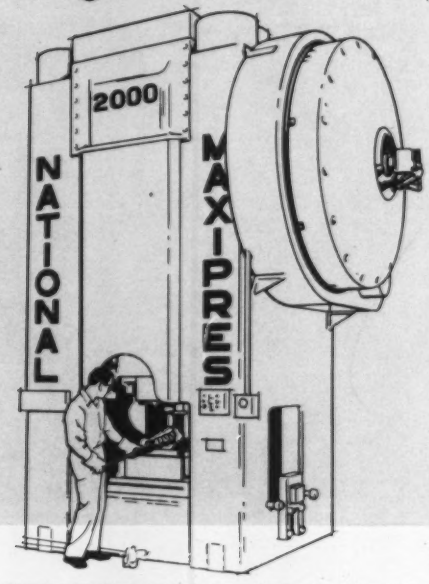
1. Prepare forging blanks in Reducerolls;
2. Finish forge in Maxipresses on the same heat.

Cost of making these forgings, and others, reduces by *one third* (even more!) thanks to modern engineering, latest-design equipment and proven methods.

Bring your prints or forgings to Tiffin. Let's discuss your plans for automatic or manual forging, but without obligation.







Founded 1874—DESIGNERS and BUILDERS of MODERN FORGING MACHINES • MAXIPRESSES • REDUCEROLLS • COLD HEADERS BOLTMAKERS • NUT FORMERS • TAPPERS • NAILMAKERS CO-PIONEERS WITH INDUSTRY OF ADVANCED METALWORKING PRODUCTION METHODS

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HARTFORD **DETROIT** **CHICAGO**

SHORT ARC

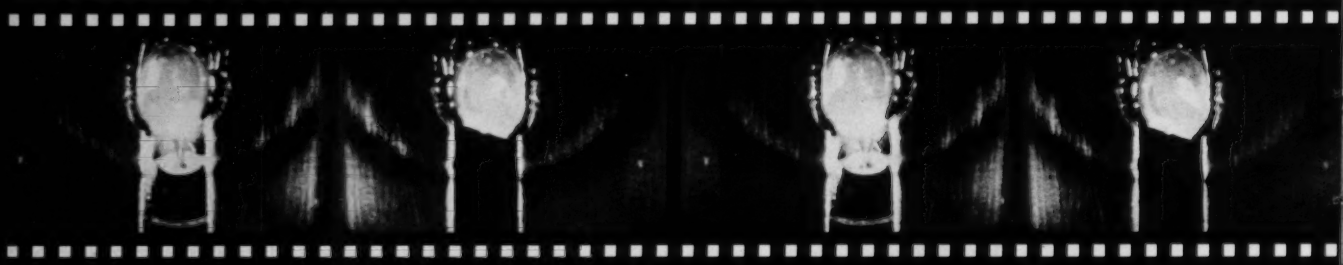
QUALITY SHEET-METAL WELDING

Sheet-metal welding has been possible, but quality welds were difficult and time-consuming. Now, LINDE's new Short Arc process—combining specialized power source characteristics, shielding gas, and semi-automatic torches—easily delivers *quality* and economy

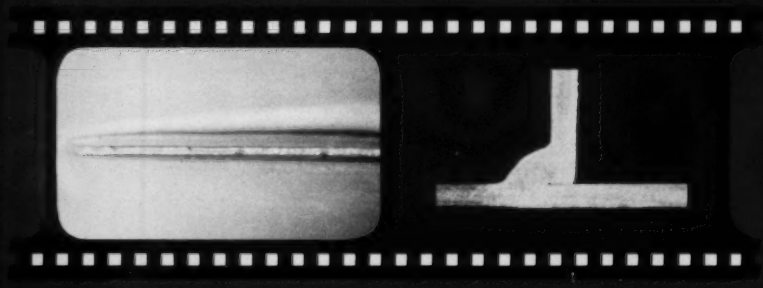
- **. . . on all sheet-metal thicknesses**
- **. . . with minimum distortion—far less than any other process**
- **. . . tolerating more than 100% gaps—even ¼-in. gaps on ⅛-in. material**
- **. . . producing 30 ft. of fillet welds for only a pound of wire and four cubic feet of gas**
- **. . . as fast as 20 inches per minute on 16-ga. sheet**
- **. . . as easy to control as a ball point pen**
- **. . . permitting all-position welding with the same settings**
- **. . . and *consistently* cleaner, smoother, more-uniform welds than any other process.**

See the next page for details.

SHORT ARC



Here is a typical LINDE Short Arc weld in the making...



...a finished bead, and a weld cross-section...

Notice the intermittent "shorting," the smooth, finished bead, the uniform penetration. No spatter. No clean-up. No finishing. Welders trained in minutes. Short Arc employs precisely controlled, low-voltage pinpoint-arcs shielded by an argon-CO_2 gas mixture. Shorting the arc lets the puddle cool, *minimizing* heat distortion and controlling burn-through for ideal penetration. Short Arc works on all common metals and their alloys, on carbon steel, stainless, aluminum and magnesium...on all types of joints...in all positions.

Only LINDE has brought together the ideal combination of materials for welding sheet metal—the SVI-300 power supply, with variable slope, voltage and inductance controls that permit an *infinite* range of settings; the C-25 argon-CO_2 gas mixture that combines with variable slope to reduce heat and control penetration; and the ST-2 and ST-4 torches, specially designed for hard and soft wires respectively. There is no substitute for Short Arc. Only LINDE offers the specialized equipment that makes such quality sheet-metal welding possible. For more information or a live demonstration, call your nearest LINDE office.

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LINDE COMPANY

UNION CARBIDE

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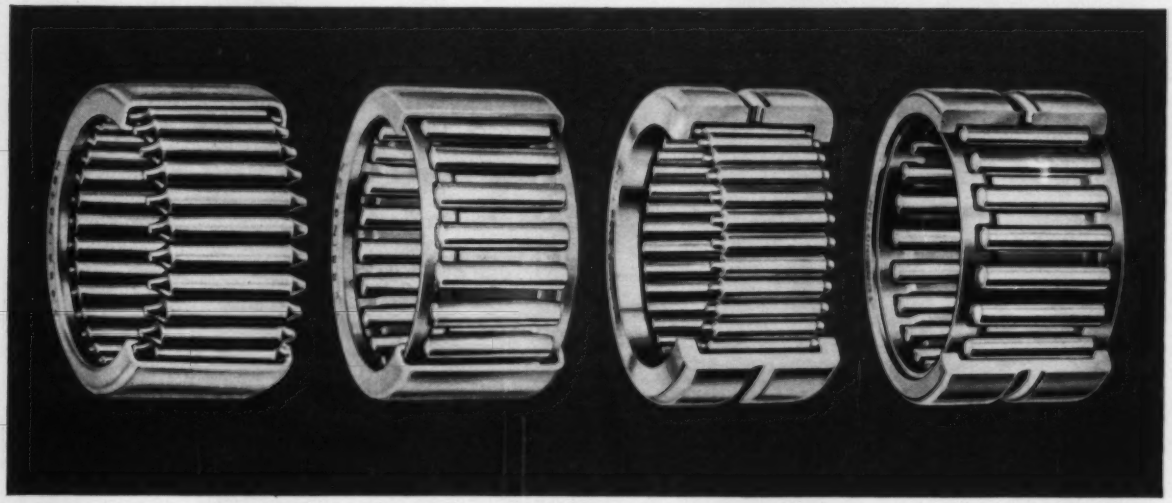
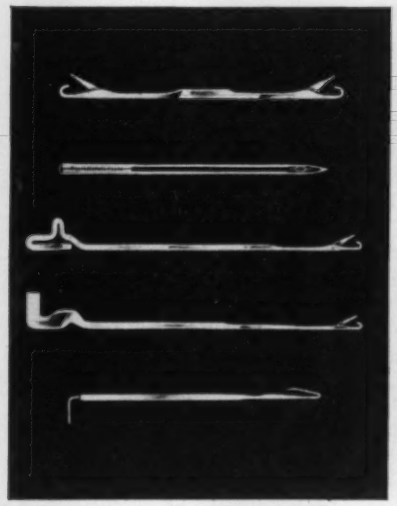
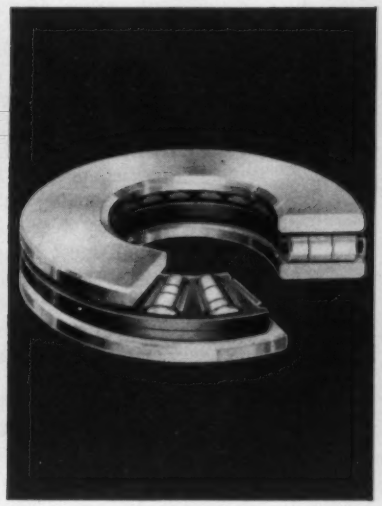
ONLY TORRINGTON MANUFACTURES ALL FOUR OF THESE REVOLUTIONARY NEEDLE BEARINGS...



THIS, TOO, IS TORRINGTON



America's largest maker of precision-made machine needles for knitting, sewing, felting, tufting—and a leading producer of surgeons needles.



Specialists in producing thrust bearings of every type, to meet all requirements, from small machine tools to giant radar installations.

America's leading volume manufacturer of small precision metal parts for assembly in a wide variety of industrial and consumer products.

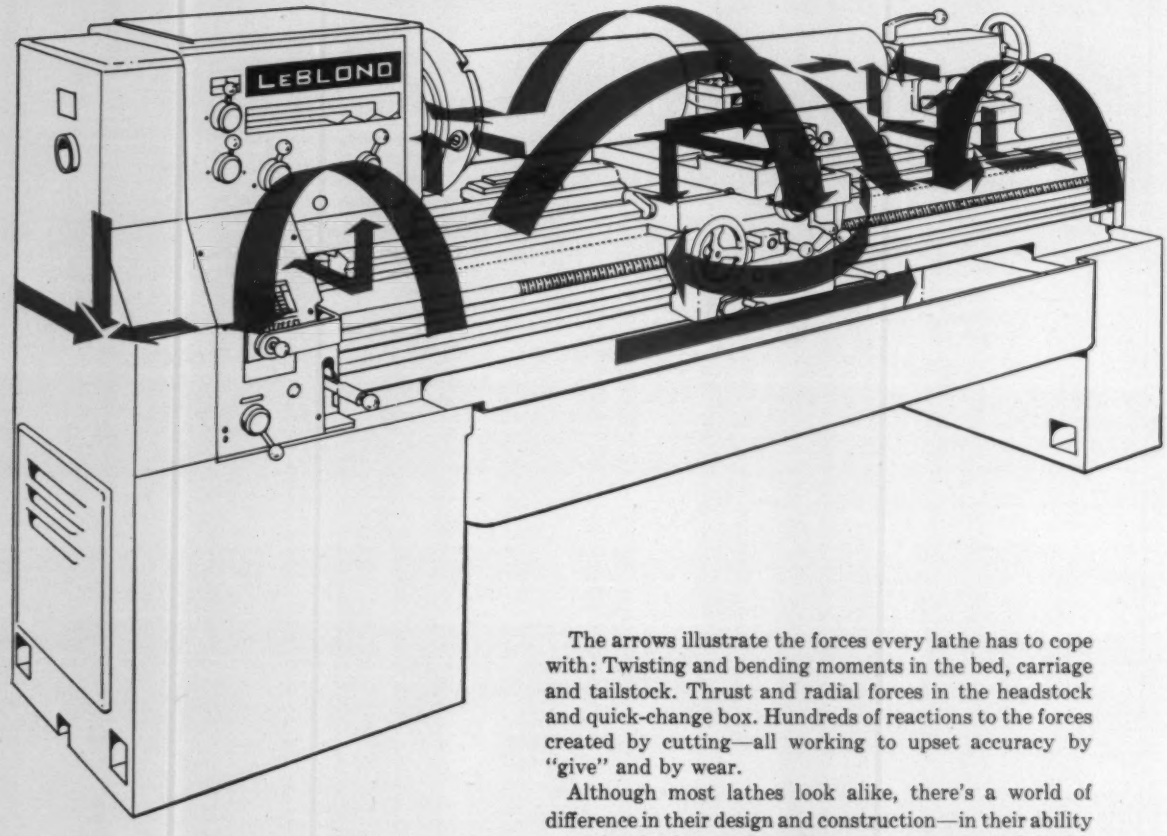
In these and many other fields throughout the world Torrington is contributing to

PROGRESS THROUGH PRECISION

THE TORRINGTON COMPANY

Torrington, Connecticut

Serving industry from plants located in the United States, Canada, England, Germany and Italy



The arrows illustrate the forces every lathe has to cope with: Twisting and bending moments in the bed, carriage and tailstock. Thrust and radial forces in the headstock and quick-change box. Hundreds of reactions to the forces created by cutting—all working to upset accuracy by "give" and by wear.

Although most lathes look alike, there's a world of difference in their design and construction—in their ability to resist the forces of cutting over many years. It's this ability that determines how heavy a cut they will take, their long-time accuracy and how much maintenance they will need.

In the new Regal bulletins you will see how well Regals meet the challenge of these forces.

The Inside Story of LeBlond Regal-Lathes

Must Reading for Lathe Users:

Two NEW bulletins describing 15 NEW Regal Lathes models. Write for them now.

Bulletin R-215B
13-15-17-19″
Regals

Bulletin R-206B
21″ and 24″
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The R. K. LeBlond Machine Tool Company • Madison at Edwards Road, Cincinnati 8, Ohio

Meet the Economic Shakedown!

It has been pretty well established that the downward push of the current recession is coming to a halt.

Production of goods and services this quarter, as measured by the gross national product, is at an estimated annual rate of $498 billion. It is expected to rise to $503 billion in the second quarter, then reach new highs in the third ($506 billion) and fourth ($515 billion) quarters.

Whether or not the upswing materializes, there is little reason to believe there will be an early return to the "more babies, bigger markets" panacea so glibly predicted for the Soaring Sixties only a year and a half ago.

The cold fact remains that 1961, and the balance of the 1960s, will be tough, competitive years in which industry will be subjected to a continuing economic shakedown.

Three areas of common concern to industry and government were indicated by President Kennedy when he talked to businessmen in Washington a few days ago: Economic growth, plant modernization, and price stability.

Emphasis on those problems means that industry must replace and expand its present obsolete productive capacity, get little or no more for the products it makes, yet satisfy stockholders with reasonable earnings.

Those things must be accomplished within the restrictive framework indicated by Labor Secretary Arthur J. Goldberg at the same conference.

He said that industry must automate to be competitive in world markets. Yet it must take care of displaced workers at the same time.

If government and industry work out the automation problem, featherbedding will disappear, he concluded.

As an added complication, Mr. Goldberg hinted that a shorter workweek lies over the horizon.

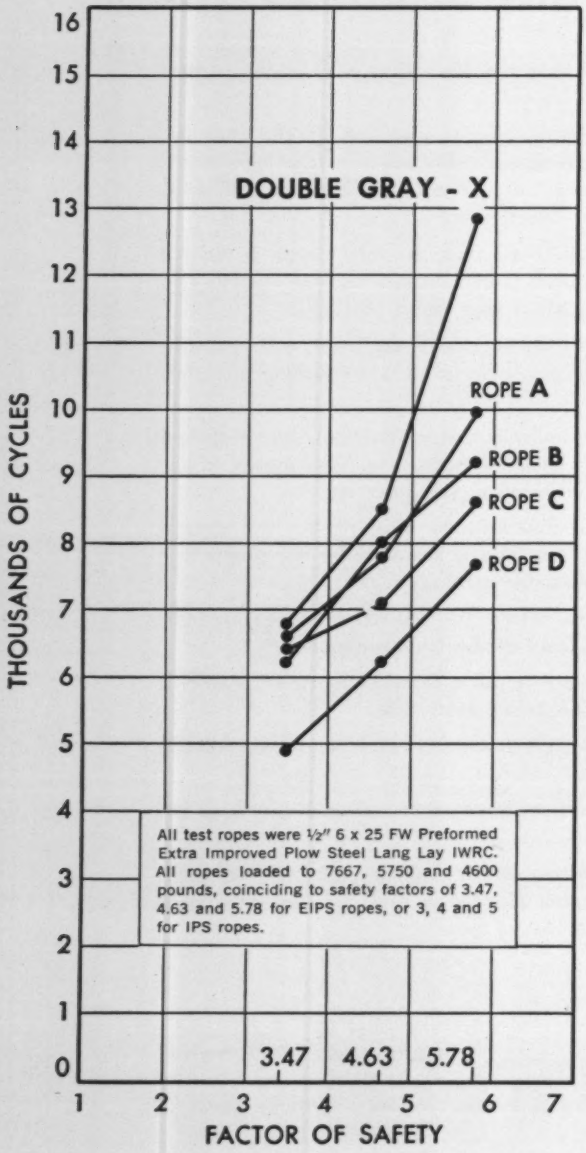
Adjustment to the economic shakedown is the challenge that must and can be met. As Secretary of Commerce Luther H. Hodges said, industry must learn to sell in the next five to ten years or be out of business!

Irwin H. Such

VICE PRESIDENT-EDITORIAL

DOUBLE GRAY-X®

Laboratory tests prove that CF&I-Wickwire's premium wire rope has 45%* more bending life than the average of other ropes tested



The CF&I-Wickwire engineers who developed Double Gray-X *believed* in their product. So confident were they of its superiority that they decided to field-test prototypes of Double Gray-X as soon as they were perfected. In the months that followed, the top American firms chosen to participate in these tests delivered this verdict: when the going really gets tough, Double Gray-X lasts longer than other wire ropes.

Now, CF&I presents additional proof that Double Gray-X has *superior resistance to bending fatigue*, the chief enemy of wire rope life. In an extended series of tests conducted over the past year at CF&I's Palmer Plant, Double Gray-X proved itself superior to four other wire ropes, all made by major manufacturers.

HOW WERE THE TESTS CONDUCTED?

The five wire ropes tested—all identical in size and specification — all exceeded the catalog breaking strength of extra-improved plow steel ropes. Each rope was subjected to the same series of tests on a 25,000-pound, multiple-reeved fatigue machine, the largest of its kind. This machine punishes wire rope to destruction by bending it back and forth over sheaves.

*Percentage above average of all other wire ropes tested at safety factor of 5.78

lasts longer

WHAT WERE THE RESULTS OF THE TESTS?

As the chart indicates, Double Gray-X lasted longer than any of the four competing wire ropes at all the safety factors used in the test. At the highest and most commonly-used safety factor, Double Gray-X lasted 30% longer than the rope that lasted next longest, and 68% longer than the rope that lasted the shortest time. Double Gray-X lasted 45% longer than the average of all other wire ropes tested at this safety factor.

WHY DOES DOUBLE GRAY-X LAST LONGER?

It lasts longer because it's the result of a breakthrough in wire-drawing technique. This new process, which includes the use of molybdenum disulphide, creates these outstanding fatigue-resistance factors in Double Gray-X:

- **A Molecular Shield** – Molybdenum disulphide creates a shield around every wire, which serves as a lubricant and prevents the wires from grinding together as the rope operates. Less internal friction results in longer rope life.

- **Smoother Wire Surface** – CF&I's new wire-drawing technique helps eliminate minute surface imperfections in the wire. This smoother surface provides better resistance to fatigue.

- **Extra Toughness** – Molybdenum disulphide lubricates the wires during the drawing process. Since less power is required and less heat generated during this operation, the original toughness of the wires is better preserved.

WHAT CAN DOUBLE GRAY-X DO FOR YOU?

It can save you money. Because Double Gray-X lasts longer on even the toughest jobs, it cuts wire rope repair and replacement costs and rope-installation time. The net result to you is an overall reduction of costly equipment downtime, and a lowering of your total wire rope investment.

As a matter of fact, those of our customers who have already bought and field-tested Double Gray-X have reported considerably longer life and less downtime on their equipment. Join these satisfied customers—try Double Gray-X on *your* equipment right away. Ask your CF&I salesman to give you complete details on these tests.

The Colorado Fuel and Iron Corporation

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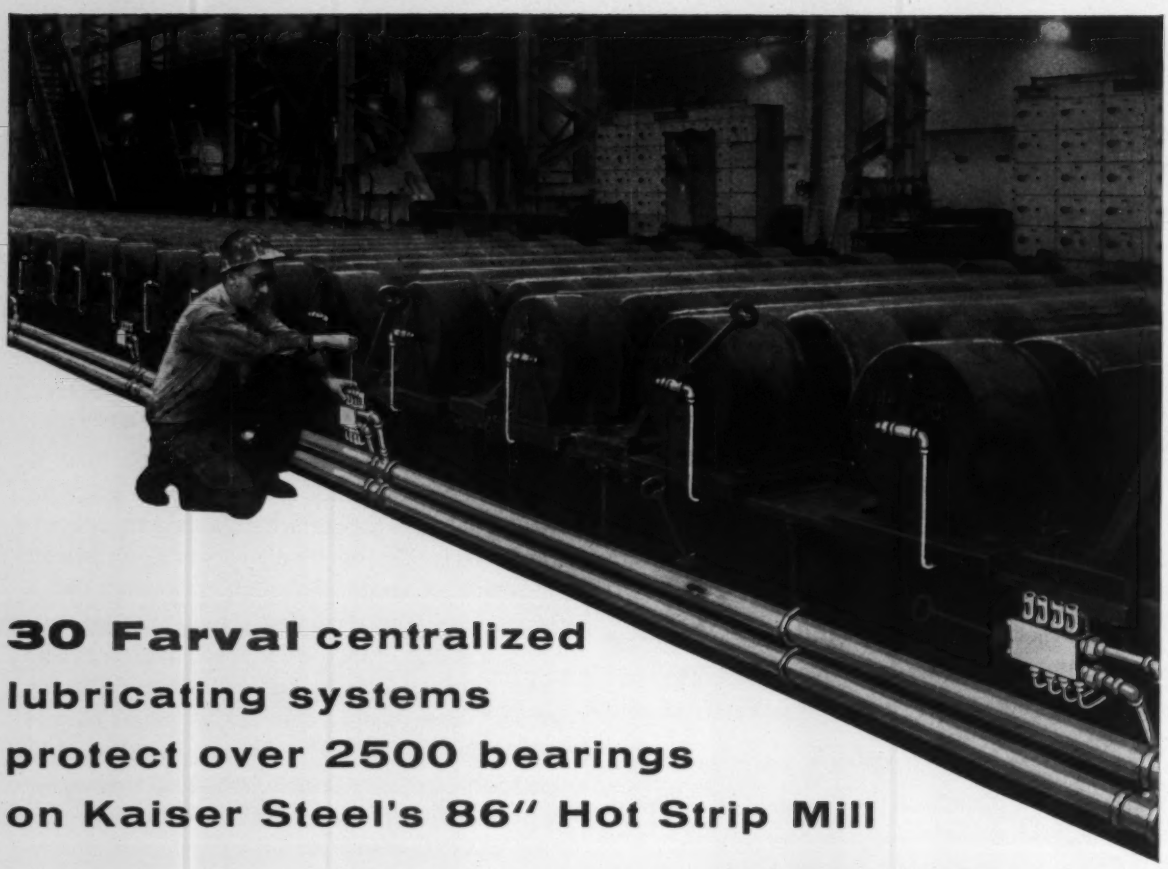
8190

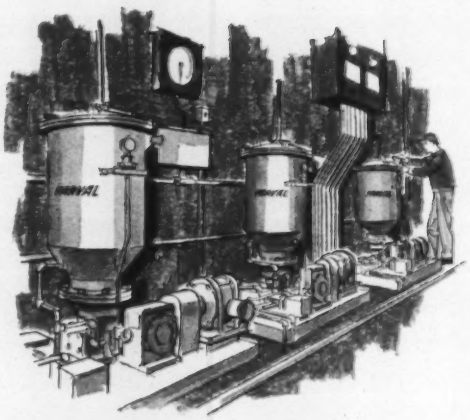


30 Farval centralized lubricating systems protect over 2500 bearings on Kaiser Steel's 86" Hot Strip Mill

Here on the mill table, between No. 4 and No. 5 roughing stands, Farval's positive, dependable lubrication is continuously on the job to prevent overheated, damaged bearings—costly mill shutdowns. A central bulk filling system is currently being designed and installed that will serve all the mill's Farval automatic stations.

On their 45 x 90-inch Universal Slabbing Mill, Kaiser engineers installed 15 Farval systems to serve over 1400 vital bearings. Also, 3 of Kaiser's 4 blast furnaces and over 100 different mill cranes get round-the-clock lubrication—thanks to modern engineered-for-the-job Farval systems.

Remember, for the ultimate in bearing protection—it's Farval. For the latest information on what Farval can do in your plant, write for free Bulletin 26-T.



• Three of many automatic, time clock controlled, end-of-line Farval Central Stations that serve Kaiser Steel's rolling facilities.

Farval Studies in Centralized Lubrication No. 254

Farval Division
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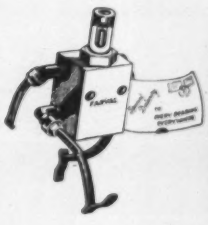
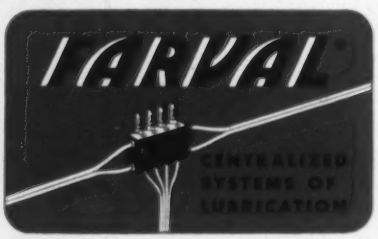
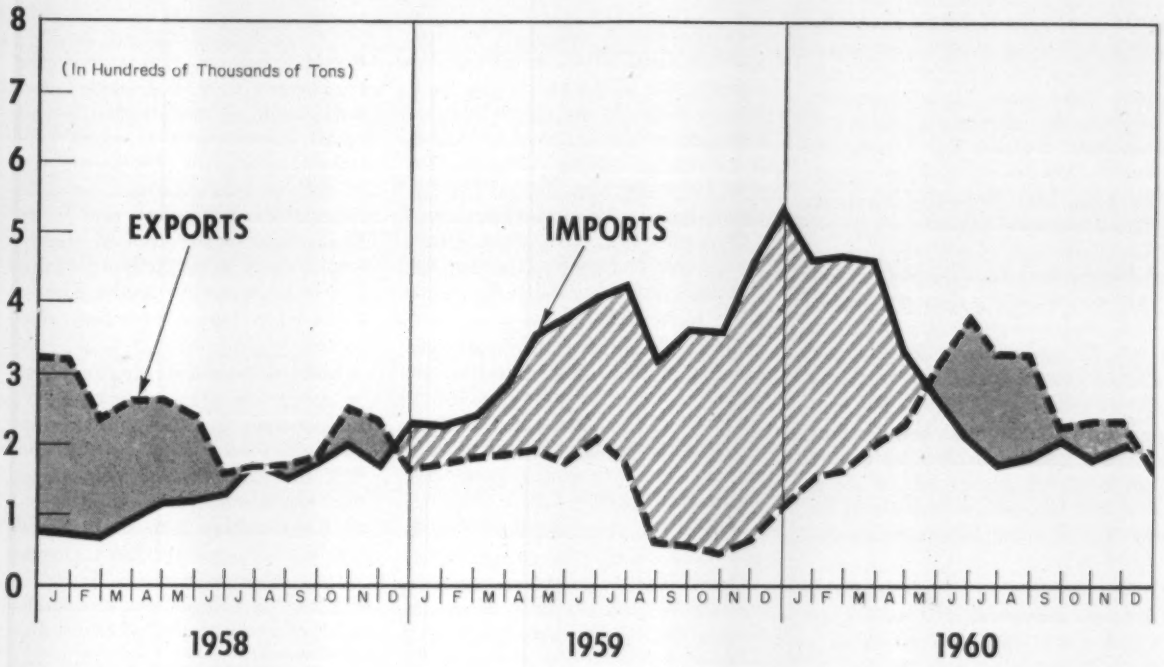
3270 East 80th Street • Cleveland 4, Ohio

KEYS TO ADEQUATE LUBRICATION
Wherever you see the sign of Farval—familiar valve manifolds, dual lubricant lines and central pumping station—you know industrial equipment is being properly lubricated.





Foreign Trade in Steel Mill Products



Steel Export-Import Gap Narrows

THE U. S. steel industry is fighting hard in the mill product export-import race, but the contest is touch and go.

Although imports in 1960 (excluding iron products, ferroalloys, and fabricated steel items) exceeded exports for the second straight year, the tonnage gap narrowed markedly. In seven months of the year, exports topped incoming shipments by a substantial margin.

• **Outlook for 1961**—Commerce Department officials aren't too optimistic about prospects for steel exports this year. They feel we'll be doing well to match last year's tonnages.

One official says: "If the oil industry in Venezuela should boom, there could be a sudden surge in demand for pipe. But we don't see anything which leads us to believe 1961 exports will go higher than 1960's. In fact, they have been slackening the last several months, and that trend could continue."

In data for 1960, the balance of steel trade for the year, in terms of value, favored exports, reversing a situation that had developed in strike-ridden 1959. The favorable balance is explained by the fact that U. S. steel exports consist mainly of high value products (such as tin plate, cold rolled sheets, and special steels) whereas imports run heavily to the less costly items (such as reinforcing bars, wire rods, and wire products).

• **Tonnage Is Down**—Last year, imports totaled 3,353,079 net tons valued at $448,820,000. In 1959, the import tonnage amounted to 4,394,312 tons, worth $515,400,000. Exports in 1960 totaled 2,978,487 tons, valued at $600,783,000. That was up sharply from the 1,658,884 tons, valued at $363,278,000, exported in 1959.

Significantly, 1960 imports were second only to the record tonnage brought into the country in 1959 (when the U. S. industry was tied up for 116 days by a strike), and are estimated to have accounted for about 5 per cent of total new steel supply in the U. S. during the year. However, that was down from the preceding year when imports accounted for a little more than 6 per cent of total supply.

• **Trade Leaders**—Principal products imported last year were: Concrete reinforcing bars, accounting for 15.3 per cent of the total steel import tonnage; steel pipe and tubing, 14.3 per cent; wire rods, 13.4 per cent; sheets and strip, 11.3 per cent; other types of bars, 9.7 per cent; structural shapes, 9.5 per cent.

Principal supplying countries dur-

ing the year continued to be Belgium and Luxembourg.

Exports last year accounted for about 4.2 per cent of the total tonnage (domestic and foreign) shipped by U. S. mills. Starting with November, 1959 (right after the steel strike), exports rose for eight straight months, hitting a peak in June, 1960, at 382,451 net tons. Thereafter, there was a steady monthly decline, the movement hitting a low point for the year at 162,000 tons in December. For seven months last year, May through November, exports exceeded imports.

• **Flat-Rolled Leads** — Sheets and strip accounted for 44.8 per cent of total steel mill product exports last year, tin mill items, 23 per cent, structural shapes, 9.9 per cent, and steel pipe and tubing, 6.5 per cent.

Government foreign trade experts say the rise in U. S. steel exports last year was due mainly to strong demand for cold rolled sheets by the British and German auto industries.

Government men now say that the auto industries of Great Britain and Germany are well stocked with steel. In fact, they say, the slackening of exports in the latter part of 1960 was attributable to considerable extent to slackening of foreign automotive requirements.

Rails Lose Test Rate Case

The Interstate Commerce Commission has killed railroad industry hopes for using a new system of contract rates to win back business lost to trucks.

In a test case, the ICC rejected a proposal by the New York Central Railroad to give reduced rates to shippers who sign contracts promising to send 80 per cent of their shipments via NYC. The proposal, a specific rate of $1.55 per 100 pounds (regular rate: $1.85 per 100 pounds), applied to rugs and carpeting moving from Amsterdam, N. Y., to Chicago.

The inevitable result would be "to destroy competition for the duration of the contract," said the ICC, noting that NYC had agreed that if the rates were approved, they would be extended to many other commodities and shipping points.

Court Orders GM to Turn Over 'Secret' Documents

A FAR-REACHING precedent involving the disclosure of company financial records may have been established in the antitrust action being brought against General Motors Corp. by the Justice Department, believe industry observers.

The question: Can a grand jury secure cost and profit data that are normally considered by the company as secret?

Judge Edmund L. Palmieri has ruled that GM must submit secret financial data involving its Electro-Motive Div. to a grand jury that's investigating a possible monopoly in the diesel locomotive business.

Upon a motion filed by the Antitrust Division, the same court (U. S. District Court for Southern New York) has also ordered certain documents of GM's AC Spark Plug Div. to be sent to Washington for closer study. The documents allegedly contain evidence of a violation of the Sherman Antitrust Act in regard to auto filters.

• **Significance**—Insiders say it's the first time any investigative body of any sort, including Congress, the Renegotiation Board, and the Justice Department, has obtained cost and profit data on that scale from GM. (In two other cases against GM, the bus monopoly case that has gone to trial, and a civil suit against GM's Euclid Div., the courts permitted Justice to see part, but not all, of the cost and profit data involved.)

• **What It Means** — It's possible, say observers, that the Justice Department is trying a new approach to proving antitrust violations. It may argue that high profits are evidence of a monopoly or intent to monopolize.

The Sherman Act defines a monopoly this way: It is the power "to raise prices or to exclude competition when it is desired to do so," coupled with "the purpose or intent to exercise that power."

• **GM Speaks** — GM argued that the request for such documents was a violation of the Fourth Amendment (unreasonable search and seizure), that the documents had no relevancy to the grand jury's investigations, and that the Justice Department really wanted the information to bring civil suit against GM to eventually cut the Electro-Motive Div. away from the corporation.

Such data are neither evidence of power nor intent to monopolize, GM added.

• **Trade Secrets**—GM also argued that the Electro-Motive Div. is one of 34 divisions and that it sells products other than diesel locomotives. The company said that it has a strict policy forbidding unauthorized disclosure of periodic division reports used to prepare consolidated corporate information. Only eight copies of divisional financial reports are made, and when they have outlived their usefulness, they are destroyed in paper shredding machines.

Such security measures are necessary, officials point out, to avoid helping competitors set prices, plan marketing campaigns, adopt GM's production techniques, negotiate labor rates, or use GM accounting methods to control costs.

• **Secrecy Promised**—Judge Palmieri promised GM all the secrecy of the grand jury process to protect its trade secrets, and antitrust officials set up strict limitations on the availability of the material. But the judge ruled that the grand jury had the right to decide for itself what documents were relevant to the case and that costs of production were needed to determine whether monopoly exists.

GM countered that the existence of profits or losses is not evidence of anything but efficiency on one hand and research and development costs, startup costs, or product improvement on the other.

How to Thwart Union Organizing Campaigns

"TAKE A CLOSE, hard look at the union organizing man—1961 model—his techniques and gimmicks to win men's minds." That advice was given to executives attending the American Management Association's personnel conference in Chicago by Theophil C. Kammholz, veteran labor observer and a partner in the Chicago law firm of Vedder, Price, Kaufman & Kammholz.

He said the union organizer enjoys four strategic advantages over the employer: 1. To the organizer, unionization is a full time job and his life's work; it's not merely one of many responsibilities. 2. The organizer—not the employer—decides when the organizational attempt will take place. So he'll pick a time when either employer or employee resistance is low. 3. The union usually knows better than the employer how well—or poorly—the organization campaign is going. 4. There still exists in some degree the illusion in employees' minds that all unions and union leaders are unselfishly devoted to the cause of the workingman.

"For the employer to survive those disadvantages," Mr. Kammholz said, "he must maintain a continuing interest in, and knowledge of, the feelings, motivations, and frustrations of his employees. He should be able to complement his other lines of communication by being generally able to gage the amount of support for the union among his employees by analyzing the techniques and moves employed by the union in its campaign. Further, he should know not only how and when to parry every union thrust, but how and when to take the offensive himself—all without violating the law and with an acute awareness that timing is of the essence."

• **Watch These Tactics** — Mr. Kammholz listed five tactics that unions are using in their organizational drives:

1. **Comparing Wage Rates**—This is still a favorite propaganda technique. Mr. Kammholz warned that the union's offerings will include vague references to higher wage rates in the area and perhaps reprints of employee paychecks in nearby organized plants. He said the union will neglect to mention that those outside employees are doing higher caliber jobs.

He warned employers that such comparisons are difficult to refute because they involve lengthy explanations. The situation calls for an employer to take the offensive and give his employees accurate information on their wages and benefits compared with those paid to employees doing like work in organized plants.

2. **Appeals to Minorities**—Where a company has many employees of a minority group, the union customarily makes specific appeals to them, Mr. Kammholz reported. For example, the union will broadcast to them over special language stations, distribute leaflets in the minority's native tongue, and use letters signed by key people in the minority group who support the union.

3. **Charges** — Another common practice is union filing of unfair labor practice charges with the National Labor Relations Board, he said. Unions use the charges and resulting investigations as propaganda and as a means of delaying an election for which the union is not quite ready. Even though the charges may be dismissed, their propaganda value must not be underestimated.

4. **Parties** — Mr. Kammholz warned that unions sometimes throw parties on the eve of an NLRB election. In one case, the Teamsters sent written invitations to all employees for free steak dinners and drinks on the eve of an election. The local plant manager countered by personally inviting all employees for free drinks a half hour earlier at another place. Nearly all the employees who came to the manager's party stayed all evening. The union suffered a resounding defeat at the polls the next day.

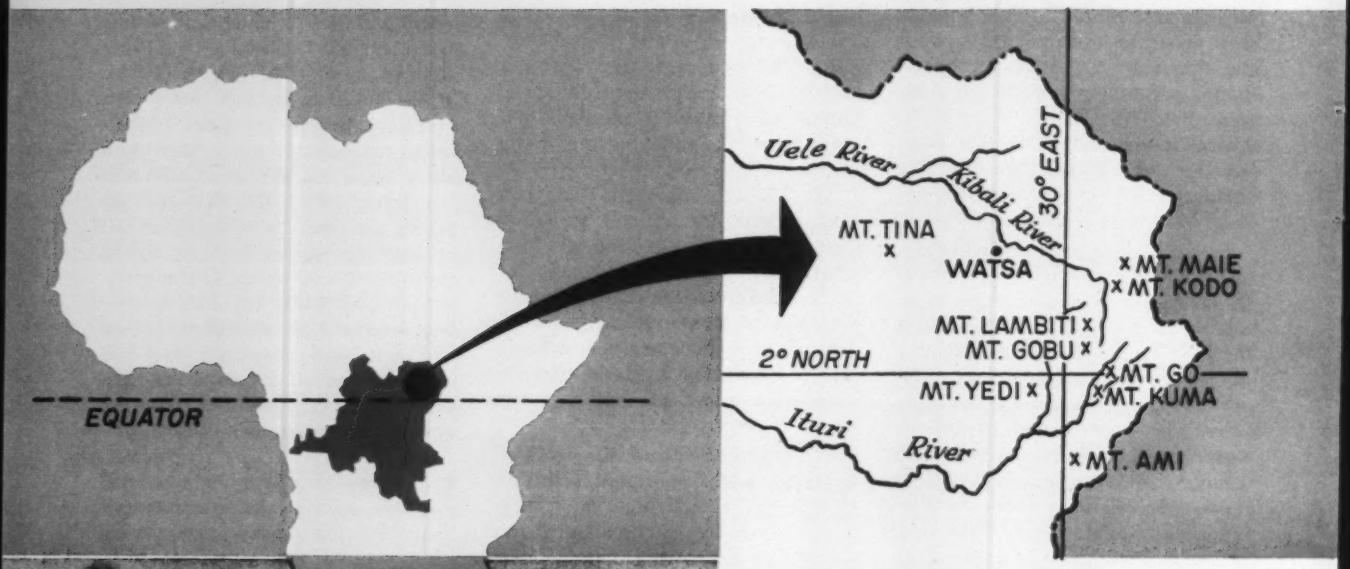
5. **Coming from Behind**—When a union is approaching its deadline and does not have authorization cards from 30 per cent of the employees (necessary before an NLRB election will be held), you can expect the union to use some unusual tactics. Mr. Kammholz said they might include threats of violence, promises of benefit, and some deception. For example, employees might be told that they can't vote in the election if they don't sign cards; or that the company has already submitted the employee's name on a list to the NLRB, and the union wants the card for the NLRB can check it against the list; or that the union wants a signed card merely to check the correctness of its mailing list. Mr. Kammholz warned that sometimes unions will also circulate a rumor that it is unlawful for an employee to sign an authorization card and then vote against the union.

• **Beware**—Mr. Kammholz pointed out that such tactics are not startling. But he warns that, to the inexperienced employee, the techniques are new and have considerable impact. They are sometimes extremely effective.

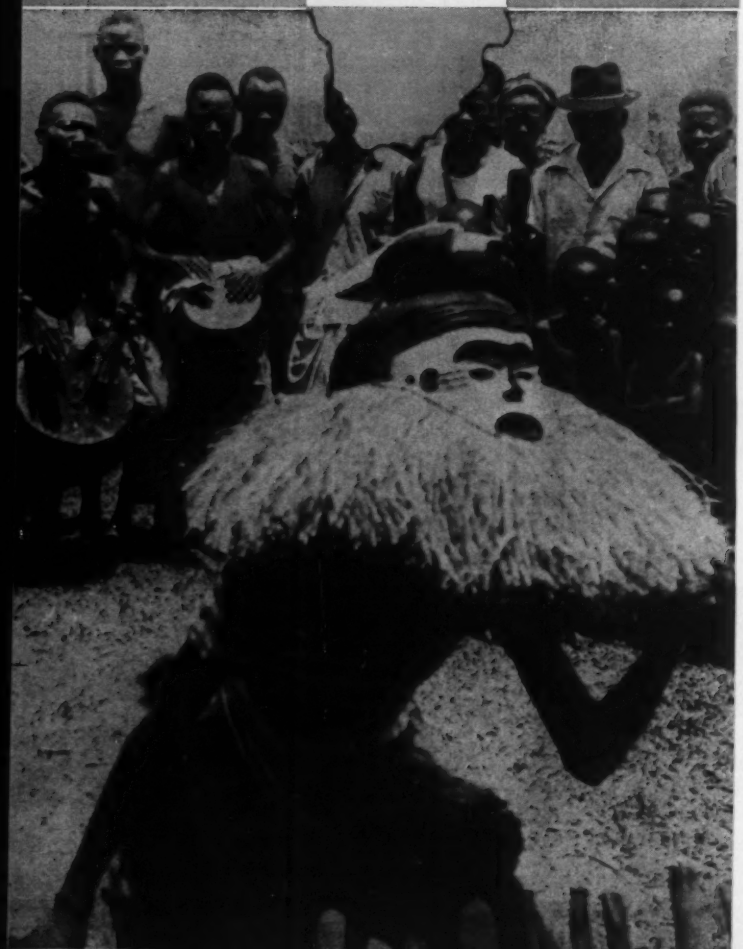
The labor observer said that management must take the offensive and use considerably more imagination in his attempts to thwart the union drives.

• **How Successful?**—Mr. Kammholz does not believe that organized labor will be able to increase the percentage of workers unionized—now 35 per cent of all nonagricultural employees. He says the shift of industry to geographical areas where there has been strong traditional resistance to unions is one factor. A rising level of education also works against the union. And so does the rising cost or organization drives. Mr. Kammholz added: "I believe that labor has failed to develop strong leadership in its lower echelons. The driving idealists have become more and more preoccupied with handling investment portfolios. Their desire for more members has been blunted by the accumulation of worldly goods. And no new generation of strong leadership appears forthcoming."

Congo Holds Treasure of



Iron ore deposits in Northeastern Congo



This article is based on "Iron Ore Resources of the Northeastern Congo," which is believed to be the first English paper on the subject. It was written by Dr. R. A. Woodtli, a Swiss geologist who spent more than ten years in the Belgian Congo.

BENEATH the politically troubled Congo lies a wealth of iron ore: About 10 billion tons of material above 45 per cent in iron content, reports Dr. R. A. Woodtli, visiting research associate in geophysics at Pennsylvania State University.

At the rate of usage in the last ten years, that would be enough to last the U. S. 100 years. (Africa now supplies iron ore to the U. S. It comes from Angola, British West Africa, French West Africa, and Liberia.)

Iron Ore

Ore Deposits of More than 45 Per Cent Iron
(In upper Ituri River basin)

Mt. Ami	Yedi
Mt. Kuma	Mt. Gobu
Mt. Go	Mt. Lambiti

Ore Deposits of More than 68 Per Cent Iron
(In upper Uele River basin)

Mt. Kodo
Mt. Maie
Mt. Tina

The Congolese ore could be a bonanza for countries like Germany, England, Italy, and perhaps Russia and India—competitors or potential competitors of the U. S. steel industry.

• **Where Deposits Are**—The deposits about which Dr. Woodtli writes are in Oriental province, about 200 miles north of the equator (see map).

The most readily accessible deposits are in the far eastern part of the northeastern Congo. It is unlikely, says Dr. Woodtli, that a steel industry will develop in this remote district. It lacks coal and limestone. But ore in Mt. Kodo has more than 68 per cent iron content and can be extracted by the open pit method with a minimum of preparatory work. This vicinity also has electrical power, good roads, trained manpower, cattle, and water. "These highly favorable conditions may make the ore attractive some day for export," Dr. Woodtli declares. "In that case and in spite of the greater distance (compared with the distance to the Indian Ocean), transportation via the Nile River to the Mediterranean deserves attention."

The second best deposit is the Mt. Tina ore located near the railroad Aketi-Paulis-Mungbere. This ore, he says, has an iron content of more than 68 per cent.

• **Background** — Some of the ore bodies were discovered about half a century ago, says Dr. Woodtli. "Other discoveries were made in the course of prospecting for either detrital or primary gold deposits and in the course of geological mapping.

"Generally, these observations were merely recorded without any detailed examinations of the ores. During the years, the exploration of some gold deposits brought some valuable information on the iron formation in addition.

"It was obvious that their geographical location made them economically unworkable; their export was out of question, and there were neither close coal deposits nor a local market. The recent improvements of the direct reduction processes of iron ores, the existence of water power reserves in the territory, and the need for industrial growth in the newly independent Congo will perhaps make these deposits more attractive in the near future," Dr. Woodtli opines.

The iron ore deposits about which Dr. Woodtli writes are in the territory drained by the upper course of the Ituri and Uele Rivers.

Deposits in the Kilo region of the upper part of the Ituri River were prospected for gold and not for their iron content, but all available geological information was recorded, he reports.

"Itabirites (local name for ferruginous rocks) of higher grade are widely distributed throughout the Upper Uele Basin (or Moto Region), but through lack of topographic and geological mapping, we have not yet a complete picture of their extent. In a few localities, drilling has supplied detailed information on the rocks at depth."

• **Analysis**—Iron ores of the northeastern Congo generally contain no impurities, except silica, Dr. Woodtli asserts. "Manganese, nickel, chromium, titanium, phosphorus, and sulfur are commonly very low, or are missing," he adds.

"It must be noted," he points out, "that the ore composition even in the hematite lenses is known to change below the water table; carbonates, iron, and arsenic sulfides are scattered through the rock and may be abundant enough to preclude any exploitation in the present technical conditions."

Though insufficient detailed work, particularly drilling, has been done to permit accurate estimate of the reserves in the deposits, a first appraisal based on the available data may provide a reasonably good approximation, he comments.

"According to my observations, the total of all known iron deposits in the northeastern Congo may be estimated at about 10 billion tons of ore above 45 per cent iron," Dr. Woodtli says.

Power and Bauxite Benefit Ghana

JUST WEST of the Congo's rich iron ore regions lies the Republic of Ghana. Its untapped hydroelectric resources and bauxite deposits will help the young nation escape from economic dependence on cocoa.

At the urging of the U. S. government, four aluminum producers have formed a consortium, Volta Aluminum Ltd. (VALCO) of Ghana, to develop an aluminum industry within the small country. Stockholders include Kaiser Aluminum & Chemical Corp. (which heads the consortium), Aluminum Co. of America, Reynolds Metals Co., and Olin-Mathieson Chemical Corp. By 1972, they will construct an aluminum smelter, with an annual capacity of 141,000 long tons, at Tema Harbor, Ghana. Initial construction calls for four potlines with a total capacity of 94,000 long tons, costing $128 million. A $50 million, two pot line will be added later.

• **Financial Arrangements**—Wash-

ington officials are considering financing for VALCO. A $32 million equity investment will be made by the four companies, while $146 million will be in the form of a long term loan to VALCO. The firms' portion can be guaranteed by the Development Loan Fund, the International Cooperation Administration, the Export-Import Bank of Washington, or all three. Binding commitments must be made for the entire amount before work can begin; $11 million will be required in the 1961-64 period; $121 million in 1965-68; and $46 million in 1969-72.

• **Tax Concessions** — Under the Pioneer Industries & Companies Act of Ghana, VALCO will not pay income taxes for ten years, or during the time required to recoup its equity investment—whichever period is shorter. The U. S. Treasury is also considering a concession: Under it, the companies wouldn't have to pay U. S. taxes on dividends from VALCO for the same period. Kaiser says the U. S. Senate must ratify the U. S.-Ghana Tax Convention or the aluminum companies will not be able to complete the deal.

• **Power Project Underway**—Three dams are to be built across Ghana's Volta River to provide the republic with 1.1 million kw of electrical power. The largest manmade lake in the world (3500 sq mi) will back up behind the 370 ft high, 2000 ft long, rockfill Aksombo Dam. The dam's power station will generate 756,000 kw to serve VALCO's Tema Harbor smelter. Kaiser Engineers & Constructors Inc. is doing preliminary work on the dam and acting as a consultant to the Ghana government.

The hydroelectric project is planned in four steps. Its estimated total cost is $314 million. That figure includes a 190,000 kw, $75 million power installation which the Russians have promised to build on the Black Volta River near the border between Ghana and the Ivory Coast.

Fifty per cent of the hydroelectric project will be financed by Ghana. The other half will come from the United Kingdom, the World Bank, or U. S. agencies like the Ex-Im Bank and the Development Loan Fund.

The Role of America's Business Statesman

He offers ways for nations to develop resources

CHAD F. CALHOUN

"THERE CAN BE NO DOUBT that the desire of the people of Africa for a better way of life constitutes one of the greatest challenges of our time," says Chad F. Calhoun, vice president of Kaiser Industries Corp.

Mr. Calhoun is one of the new type of business-statesmen who is helping newly emerged countries plan for the development of natural resources.

• **Kaiser's Entry**—In 1958, Kaiser Engineers & Constructors Inc. was asked to reappraise an old study regarding hydroelectric potential on Ghana's Volta River. Today, Kaiser has interests in an aluminum smelter and hydroelectric projects in Ghana. An engineer since 1920, Mr. Calhoun worked on the Hoover and Bonneville Dams, and he helped plan Kaiser Steel Corp.'s Fontana (Calif.) mill. He has made 18 trips to Africa, the latest a few weeks ago. Now a director of Volta Aluminum Ltd. (VALCO) of Ghana (see Page 35), he comments: "We believe in working on a fair, understanding, and enlightened basis. It is our duty, function, and privilege to serve in Africa as a counterforce to the threat of Communism."

• **Showcase Country** — "Judged purely by commercial standards, the (smelter) project has a profit making future. We believe U. S. industry can and should take the lead in assisting newly developing countries. This beginning in Ghana is but a small part of what we ultimately hope to do there. We are concentrating on it first to make it a showcase for the world," says Mr. Calhoun.

He admits that in the face of lower earnings and excess aluminum capacity "it has not been easy to maintain interest," but he and Kaiser's president, Edgar J. Kaiser, "have more than just a balance sheet interest in business."

• **Behind the Scenes**—A huge project such as this goes far beyond the usual patterns of business. The function of the business-statesman, as an unofficial representative of his government, can be more meaningful than the work officials from the State Department or other agencies. Private talks with the heads of governments, checking sentiment within a country, and working with local government men who would stall projects for personal or political reasons, all demand high caliber effort.

In the case of Ghana, it is believed by some that the U. S. has a solid friend. Yet it is a friend that must consistently defend its pro-American feelings to countrymen who fear colonialism or secretly advocate Communism.

General Electric, Union, Face Unfair Labor Charges

General Electric Co. has been hit with a charge of unfair labor practices by the New York office of the National Labor Relations Board. At the same time, the International Union of Electrical Workers has been cited on other charges in complaints issued against six locals by NLRB offices in Buffalo and Boston.

Both complaints stem from the three week national strike called last October by the union against GE.

The hearing against the company will be held in New York on Mar. 13 before a trial examiner. His findings will go to Washington for final determination. GE is charged with failure to bargain in good faith during the contract negotiations. The complaint also charges: That the company tried to break the strike by making separate and more attractive offers to employees in Schenectady, N. Y., and Lynn and Worcester, Mass.; that through pamphlets and advertising, the company illegally tried to induce union members to desert their leaders; that the company tried to bypass union negotiators and deal directly with employees.

The union is charged with picket line violence and other misconduct during the strike.

ASM Realigns Top Staff

A major staff realignment at American Society for Metals, Cleveland, has been announced by Allen Ray Putnam, managing director.

Ernest E. Thum, editor in chief of *Metal Progress*, the society's magazine, was named director of editorial services to co-ordinate all editorial goals, the content of all publications, and the editorial staff.

A. P. Ford, director of communications, is responsible for the business management of all communications media, advertising, and public relations.

Albert L. Lloyd, director of administrative services and finance, assumes supervision of internal administrative actives and financial management of the society.

Weaker Sex Strengthens Its Status in U. S. Industry

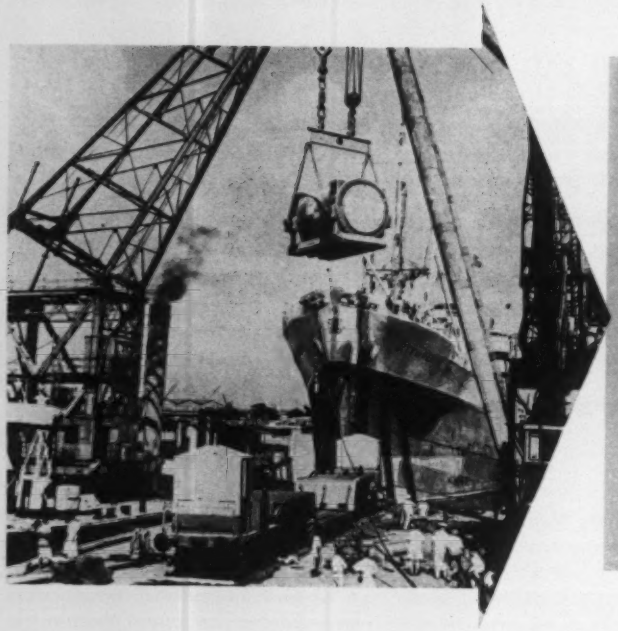
A SURVEY of 1900 firms by the National Office Management Association finds that "a tremendous advance" has been made in industry's personnel practices for female workers. But a substantial number of companies still have separate policies for men and women in areas where they could be the same.

W. T. Cavanaugh, NOMA's executive director, says "the largest untapped source of manpower in the U. S. is womanpower" and that if industry is to meet its needs for educated supervisors, "this source must be tapped more thoroughly than ever before." He says there is a need for companies to re-e: amine personnel policies as they relate to female workers.

Here are some of the significant survey results:

- For jobs that can be handled equally well by men or women, 33 per cent of the employers prefer women and 32 per cent prefer men. (35 per cent have no preference.)
- When a higher position becomes vacant, 52 per cent of the firms give preference to a man over a woman when both have equal qualifications.
- 33 per cent have a double pay standard for men and women in the office.
- 57 per cent expect a higher level of performance from men than from women.
- 65 per cent "have qualms" about placing a woman supervisor over a department employing men.
- 68 per cent believe men "have a better chance for success" than women in supervising all-female departments. (11 per cent think women are better for the job.)
- 14 per cent prefer men for data processing departments using electronic equipment, while 11 per cent prefer women. Others have no preference or no opinion.
- 35 per cent think the use of more electronic equipment will tend to woo more male workers back to the office.
- 80 per cent say women employees have higher rates of absenteeism than men.
- 75 per cent say they find more problem workers among women than men.
- 52 per cent say female workers tend to be more neurotic than men.
- 26 per cent grant special privileges to females.
- 28 per cent say they have jobs where sex appeal is a qualification and is given serious consideration in hiring.
- Only 8 per cent never hire women over 35.
- When a female office employee displays poor judgment in handling her job or in making an important decision, 28 per cent of the bosses say they tend to be more lenient than they would be with a man; 1 per cent tend to be more critical; 68 per cent say they treat male and female employees identically.
- NOMA is initiating programs to help member companies adjust policies toward female workers.

Iron Curtain Nations Buy More U.S. Goods



	(Millions)
1960*	$160.0
1959	89.4
1958	113.1
1957	86.1

*Estimated.
Source: Commerce Department.

THE WHITE HOUSE may ask the Commerce Department to liberalize its administration of the Export Control Act, believe some officials high in the administration. The reason: U. S. companies seeking bigger markets overseas may be able to double or triple their sales in a relatively short time by trading with Soviet bloc countries.

The act is designed primarily to do three things: 1. Protect the domestic economy from the loss of scarce materials and reduce the inflationary influence of abnormal foreign demand for those materials. 2. Further the foreign policy of the U. S. 3. Guard against shipping strategic items to unfriendly nations.

A recent case (involving $1.5 million worth of grinding machines for the USSR) is an example of how tough the law is to administer. The Defense Department strongly objected to the shipment of at least two of the machines on the ground that they were not available anywhere else in the world. A Congressional committee got into the act after it appeared that the Defense Department was going to be overruled. Finally, the whole matter was put on the shelf until the Kennedy administration took over. Within 30 days, Commerce Secretary Luther Hodges approved the application for the license to ship, but he is holding up the shipment, pending a report from Sen. Thomas Dodd (D., Conn.), who wants to reduce trade with the Soviets.

● **RATE OF APPLICATIONS**—If that decision carries over to other cases, look for the rate of applications for licenses to take a sharp turn upward in 1961—it declined in the last days of the Eisenhower administration. U. S. exporters applied for licenses to ship goods worth $42.6 million to the Iron Curtain in the first quarter of 1960. Only $26.2 million worth of applications were received during the fourth quarter of the year. Licenses granted by Commerce hit a peak in the first quarter ($35.4 million), while those issued in the last quarter of 1960 were worth only $15.6 million.

Commerce rejected applications worth $10.6 million in the fourth quarter vs. $3.4 million in the third quarter. Rejections during the year totaled $24.2 million. Most of the rejections involved industrial equipment, although a license to ship $2.6 million worth of carbon steel sheets to East Germany was turned down in the last quarter.

● **POTENTIAL TRADE EVALUATED**—We shipped $350 million worth of goods to Red China in 1947. Exports to the USSR and Eastern Europe totaled about $340 million in the same year. Exports to Red China have been cut off since Chinese "volunteers" entered the Korean War. Exports to the USSR and Eastern Europe fell to almost nothing until 1957 when controls were modified and credits were granted to Poland.

Nike-Zeus Decision Due Soon

Defense Secretary McNamara told the House Space Committee last week that a decision on whether to go ahead on the Nike-Zeus program (STEEL, Feb. 27, p. 74) will be made before the end of this month.

It's your move

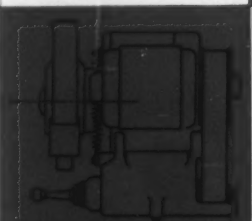
to more precise and profitable toolroom grinding with a CINCINNATI

CINCINNATI FILMATIC 12" Universal Grinder.

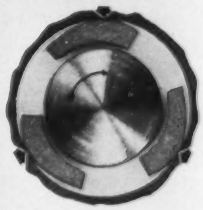
Have you noticed too many crazy-quilt setups in your toolroom? Some are quite unnecessary. They usually reflect in excessive costs, but can be easily cut down to size with new equipment having greater versatility.

In the field of precision toolroom grinding, you can move quickly toward lower costs and higher standards of quality with CINCINNATI Universals. These fine machines have a high degree of built-in skill to supplement the operator's natural ability. FILMATIC grinding wheel spindle bearings, for example, automatically maintain dead-center rotation, a necessary adjunct to producing fine finishes. Several setup feature-advantages are big cost reducers. Just consider the time that can be saved because of the lathe standard spindle nose on the headstock; the hinged, front mounted internal grinding head; the wide angle swivel ranges for grinding tapers, bevels and faces.

CINCINNATI FILMATIC Universals are by far the best buy for precision toolroom grinding. You can readily see why by noting the feature-advantages illustrated here . . . many are common to all CINCINNATI Universals, others are designed exclusively for certain sizes. Want more information? Write or telephone today for catalogs. **Grinding Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**



Hinge mounted internal grinding head

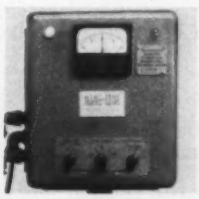


long-life FILMATIC grinding wheel spindle bearings

infinitely variable headstock speed selection (AC Drive)

headstock swivels to any practical angle

reversible wheel mount for shoulder grinding



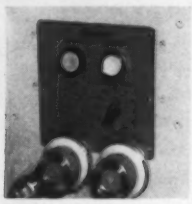
Gage-Line taper correcting unit

power rapid positioning of wheelhead

size adjustments in increments of .000050"

CINCINNATI FILMATIC 12" Universal Grinding Machine. Other sizes: 14" and 18". Catalog No. G-736.

quick acting draw-in collet attachment



push-button dual rate automatic infeed

PRECISION GRINDING MACHINES: CENTERTYPE · CENTERLESS · MICRO-CENTRIC · ROLL · CHUCKING · CENTERLESS LAPPING

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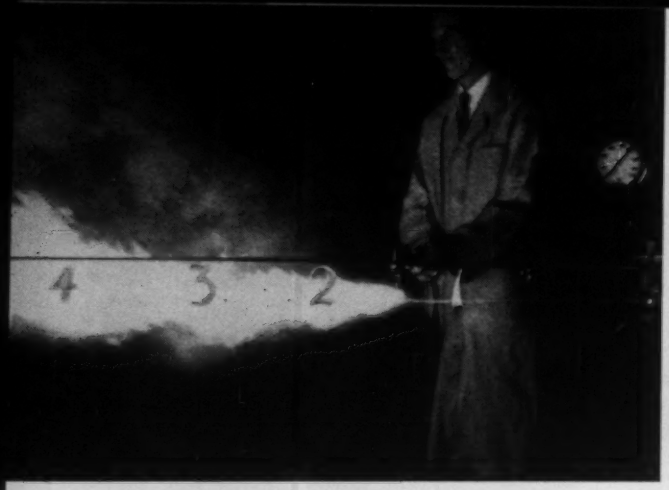
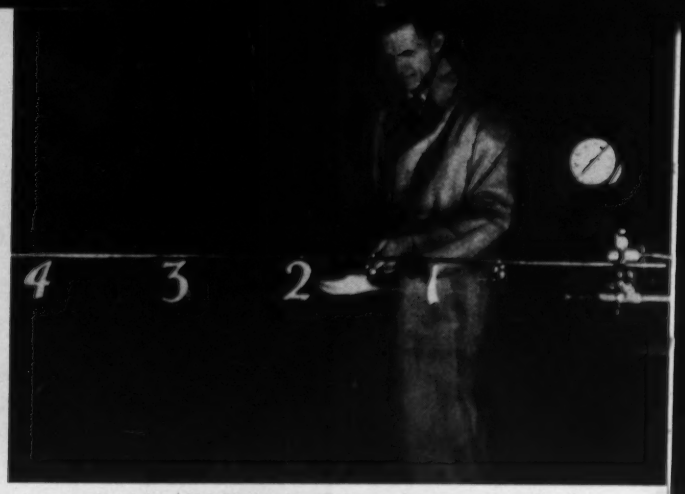


Ordinary hydraulic fluid made from mineral oil is ignited by open flame. Torch is 18 inches from nozzle orifice.



Shell Irus 902 Hydraulic Fluid, in the same test, refused to be ignited by 3000-degree flame.

BULLETIN:

3000-degree flame does not ignite Shell Irus 902—the fire-snuffing hydraulic fluid that helps make factories safe from fire

Shell forced Irus® 902 Hydraulic Fluid through a .145-inch orifice at 1000 psi pressure. The Irus Fluid was sprayed from the orifice and a 3000-degree flame thrust into the streaming fluid. Irus was not ignited.

Read the advantages of economical Shell Irus 902 and how it can protect your plant.

IRUS 902 is the fire-snuffing hydraulic fluid that protects lives and equipment.

How Irus works

Irus 902 is an ingenious combination of oil and water. The water is encased in a film of oil. In technical terms, it is a 100% water-in-oil emulsion.

But unlike other emulsions, Irus 902 has optimum stability. This is vitally important. It means that Irus Fluid will retain its lubricating qualities far longer than unstable oils—and will not allow the water to separate out. Result: the water stays in the oil, ready to snuff a fire if needed.

Other advantages

1. Cools off systems. Because of its high rate of heat transfer and high heat capacity, Irus 902 can allow hydraulic systems to run cooler.

2. Resists thickening and thinning. The viscosity of Irus 902 is tailored to protect pump parts during the entire working cycle—from cold start-up to hot, continuous operation.

3. Saves gaskets, packing, hose. Irus 902 is gentle to nonmetallic parts as well as metal. It can be used almost anywhere that you'd use mineral oil.

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5. Easier to spot leaks. Irus 902 is bright yellow, helps you spot leaks quickly.

For complete details about changing over to Shell Irus 902, contact your nearest Shell Industrial Products Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, N. Y.

A message to manufacturers of hydraulic equipment

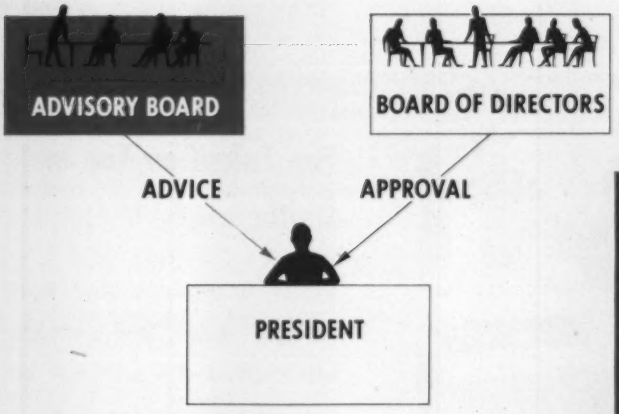
Shell Irus 902 makes an excellent initial fill.

1. It is available anywhere in the U.S.A.

2. Quality of Irus Fluid is consistently high. It must meet strict Shell specifications.

SHELL

A BULLETIN FROM SHELL
—where 1,997 scientists are working to provide better products for industry.



Top Talent on Tap For Small Firms

"OUR ADVISORY board has been a major factor in stimulating cost reduction, a good source of advice on the national and regional outlook, and a sounding board on many important matters affecting the company."

That's the way Louis E. Newman, president, Smithcraft Corp., Boston, describes the effectiveness of his advisory board—a company president, a consultant, and two retired executives of major corporations. Smithcraft produces fluorescent lighting equipment and employs about 350.

Mr. Newman dramatizes the board's role this way: What company president has not encountered soul searching moments before a far-reaching decision had to be made . . . when he realized that:

1. He had doubts about his wisdom?
2. His experience seemed limited?
3. He wasn't sure he was being fair?

The advice and counsel desired by the head of a large firm in such situations is readily available—from the board, large staffs of specialists, or an expensive consultant. But too often in the small and medium sized firm, the president doesn't have that comforting cushion—his board may lack the experience and competence to provide the type of guidance required. And there is no large staff of marketing, production, or financial experts to turn to.

Advisory boards, staffed by specialists and professional managers who have no connection with the company, offer a possible solution to the plight of the chief executive in medium and small sized firms.

• **Definition**—Mr. Newman is one of the country's most enthusiastic proponents of the concept: "Our board gives me the competent advice and constructive criticism I need to be a more effective president—yet it does not restrict (in any legal way) my powers over the affairs of the company or the company owners' ultimate power over me."

Understanding the relationship of the outside advisory board with president and company's board is important if the concept is to function properly, says Mr. Newman.

1. "The advisory board provides competent advice and counsel for the president. Our board members are strong individuals (a desirable

Advisory board members (left to right): Carter C. Higgins, president, Worcester Pressed Steel Co., Worcester, Mass.; Mr. Newman; Harold B. Maynard, president, H. B. Maynard Co. Inc., Pittsburgh; Frank D. Newbury, former Westinghouse Electric Corp. vice president and former assistant secretary of defense; James H. Carmine, former president of Philco Corp.; and Julian J. Smith, chairman, Smithcraft

Top Talent on Tap at Smithcraft

Experts in manufacturing, marketing, finance, and management advise the president on over-all corporate functions

Scientific board members (left to right): Russ Henke, Racine Hydraulic's director of research; Dr. Charles Watson, chemical engineering specialist, University of Wisconsin; Dr. Milton Goldstein, electronic control expert, American Institute of Engineering & Technology; Dr. C. Charles Miesse, specialist in fluid mechanics and applied physics, Armour Research Foundation; George Miller, executive vice president, Racine Hydraulics. Board member not present is Prof. Samuel E. Rusinoff, professor of manufacturing processes, Illinois Institute of Technology

At Racine Hydraulics

Specialists in electronic controls, fluid mechanics, chemical engineering, and manufacturing supplement research and development activities

characteristic) who exercise a high degree of persuasion if I don't agree with them. Yet persuasion is all they wield—the basic responsibility for action must rest on the shoulders of the president.

2. "The inside or company board functions like any other board—it exists to provide legal corporate approval of the actions of the president who is accountable to the directors.

3. "The president's role as the general manager and chief executive remains the same—having responsibility for the normal functioning of the total corporate organization."

Smithcraft's four member advisory board has been operating since mid-1958. It meets one day every other month with Mr. Newman and Julian J. Smith, chairman of the firm. Frequently, Mr. Newman will call in members of his management team to sit in on part of the daylong sessions when a topic or problem of interest to them is being discussed.

• **Why Four?**—"We wanted to keep the board as small as possible to serve our purpose," relates Mr. Newman. "At first we thought three might be ideal. But it could be seen that in case of controversial matters, the board might vote 2 to 1. That could be misleading to the president since he might be inclined to follow a course of action suggested by the majority, while in fact, a four man board might split 2 and 2 on a controversial issue. Such a vote would indicate much weight on both sides of the problem and that the question was one which the president must decide for himself."

Selecting the Panel

"As the advisory board concept was being developed," Mr. Newman explains, "we considered enlarging our regular board with outside people who might have an interest in the company—such as representatives from the bank handling our finances, large customers, suppliers, and area university professors."

Instead, it was decided that the company (a producer of fluorescent lighting equipment) needed advice from men skilled in manufacturing, marketing, and finance. It was considered desirable to have a geographic and age spread. A consultant, H. B. Maynard, Pittsburgh, assisted in getting the board organized. He provided resumes of about 25 potential members to Mr. Newman. (The board is pictured at top left.)

How the Board Operates

To be effective, stresses the Smithcraft president, your advisory board must know all facets of your company's history, management team, facilities, products, and markets.

The usual agenda for meetings (mailed in advance to the members) covers:

1. A discussion of financial results since the last meeting.

2. A discussion of cost reduction programs.

3. Reports on sales and new order trends.

4. A discussion of special projects or problems which might include: Top management compensation, the expansion or liquidation of operations, how upcoming labor negotiations should be handled.

Mr. Newman cites many examples of how his advisory board has been helpful. Here are three:

"Early in the second quarter last year when many business indicators were still riding high, one member said that he felt business would turn downward in May or June and follow a business slide pattern about parallel with that of the 1958 recession. He also indicated that he felt the business turnaround wouldn't come before the second quarter of this year. That advice was of tremendous help in planning our activities for the past year.

"Our company used to have a metal fabricating business. In recent years, most of its volume ($2 million in one year) had been in making containers for jet engines. The switch to missiles took the props from under that business, and despite efforts by ourselves and hired consultants, we were unable to find new markets or products; severe losses began piling up. Some 150 employees were involved in that operation. Despite the obviousness of the decision, the emotional overtones connected with eliminating part of our business were disturbing to me. By discussing the problem with the advisory board, I received the support I needed, both emotionally and intellectually, plus constructive suggestions for handling the liquidation.

"Another time, the board recommended that we raise prices 2 per cent. I resisted, citing reasons why I felt it wasn't possible—even though an increase was warranted. For months they kept after me, explaining how it could be done with few repercussions. Finally I gave in, though I still had a few doubts. The increase went through without a ripple."

Help in Specialized Areas

Smithcraft's advisory board members have skills that cover the gamut of operations in an industrial firm. Many proponents feel that the concept can be equally effective for specialized activities—engineering, personnel relations, purchasing, research and development.

Racine Hydraulics & Machinery Inc., Racine, Wis., recently set up a scientific board of advisers (shown on Page 42). It's helping the hydraulic maker's research and development staff develop new products and study potential areas for diversification, says Russ Henke, director of research.

"The basic consideration leading to the establishment of our scientific board was that a company of our size is not able to maintain on a full time basis a staff with the talents of these men," he says.

"Another advantage," he adds, "is that these men can maintain a certain objectivity regarding our problems which they would lose if they were full time employees. They also move in areas which they might not get involved in as employees. We gain from that experience."

Both Smithcraft and Racine Hydraulics pay their boards a fixed fee, plus expenses. Smithcraft reports that its board's services cost less than $12,000 a year.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Five Keys to Advisory Board Success . . .

1. **Advisers must be competent and have the respect of the president and other board members.**
2. **Advisers must be fully informed about the problems on which they advise.**
3. **Advisers must be autonomous.**
4. **The president must seek their advice and be receptive to it.**
5. **Meetings must be held in private to permit the free interchange of criticism without causing the president public embarrassment.**

Mercury Market Loses Luster

THE MERCURY INDUSTRY in 1960 was beset by the lowest average price since 1953. When final consumption figures are in, it is believed the total for 1960 will be under 50,000 flasks. A dip under that mark would be the first since 1954.

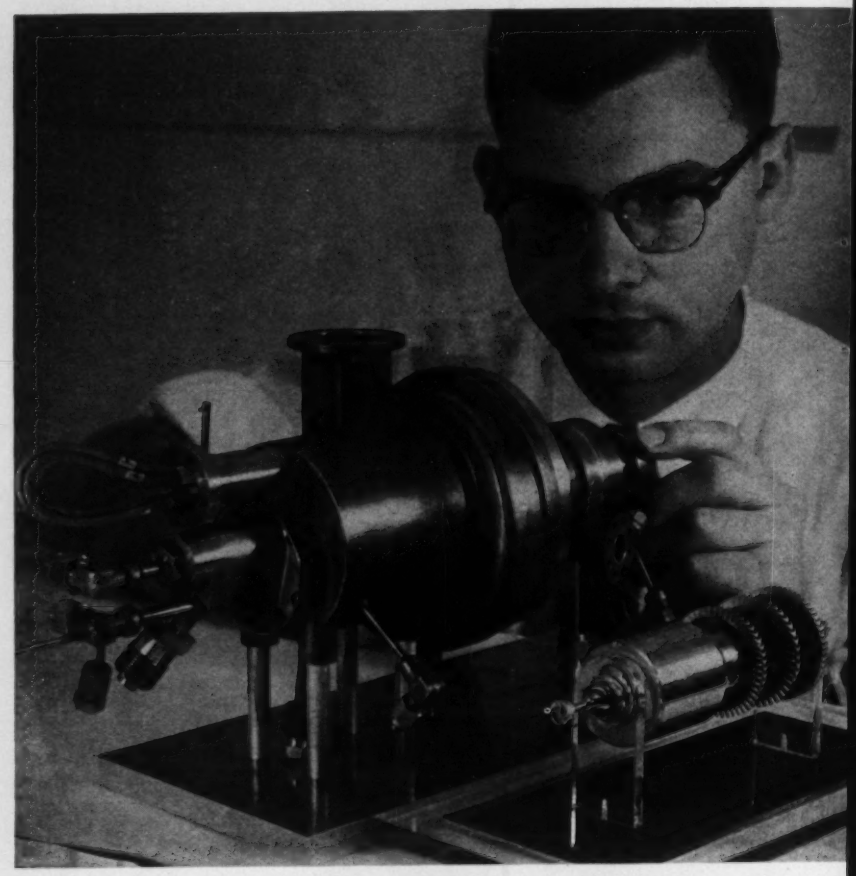
Prediction for 1961: Consumption will hold close to the 50,000 flask level of 1954-59.

• **Prices Skid**—The average price in 1960 ($210.76 per 76 lb flask) was about $17 under the 1959 average. The price in March of 1960 topped out at $214, stabilized at $209 in the August-December period, and in February of this year, quotations in New York for large lots (20 or more flasks) stood at $208 to $211.

For the first three quarters of 1960, consumption was 37,000 flasks compared with 40,900 in the corresponding portion of 1959. The U. S. Bureau of Mines estimates the year's total will be slightly under 50.000 flasks when fourth quarter figures are added. They say the shift in consumption is attributable to a decline in expansion of facilities used in electrolytic preparation of chlorine and caustic soda. At least two companies are increasing their capacities for processing the chemicals.

• **Production Holds Steady** — Domestic production in 1960 remained at about 31.000 flasks, the same level as in 1959—the year production dropped for the first time since 1950. Termination of the government's price support program, which buoyed prices and producers from 1954 to 1959, is one of the chief causes of the soft market. California continued to supply more than half of U. S. output.

• **Imports Tumble**—As part of the decreased consumption picture, general imports dropped to 19,473 flasks, the lowest point since 1947. In 1959, 30,260 flasks were imported. The U. S. continued to use more mercury than it produced last year and Spain supplied most of the total imports, followed by Italy, Mexico, and Yugoslavia.



A Thompson Ramo Wooldridge engineer inspects a test model of a turboelectric power system that offers a bright spot in the future of mercury. The turbine is driven by mercury vaporized by nuclear, solar, or chemical heat. The system, designed for space applications, recently underwent a 2500 hour endurance test

• **Principal Applications** — Substantial quantities of mercury are used in electrical apparatus, agriculture, industrial and control instruments, chlorine and caustic soda processing, paper and pulp manufacture, paint, dental prepartions, and pharmaceuticals.

Among the new entries in mercury's consumer market is the turboelectric power conversion system designed and developed for the Atomic Energy Commission by Thompson Ramo Wooldridge Inc.'s Cleveland Tapco Group (see photo).

The equipment, for use in a SNAP I auxiliary power unit, is capable of utilizing heat energy from nuclear, chemical, or solar sources to vaporize mercury which in turn drives the turboelectric machinery. It's in the prototype stage. Each unit is designed to take 20 lb of mercury.

The system delivers 2000 cycle power in the range of 300 to 1500 watts for electrical equipment aboard spacecraft.

In another development that has potential for mercury, M. W. Kellogg Co., a subsidiary of Pullman Inc., New York, has introduced a fuel cell that uses an amalgam of sodium in mercury and oxygen to produce electricity.

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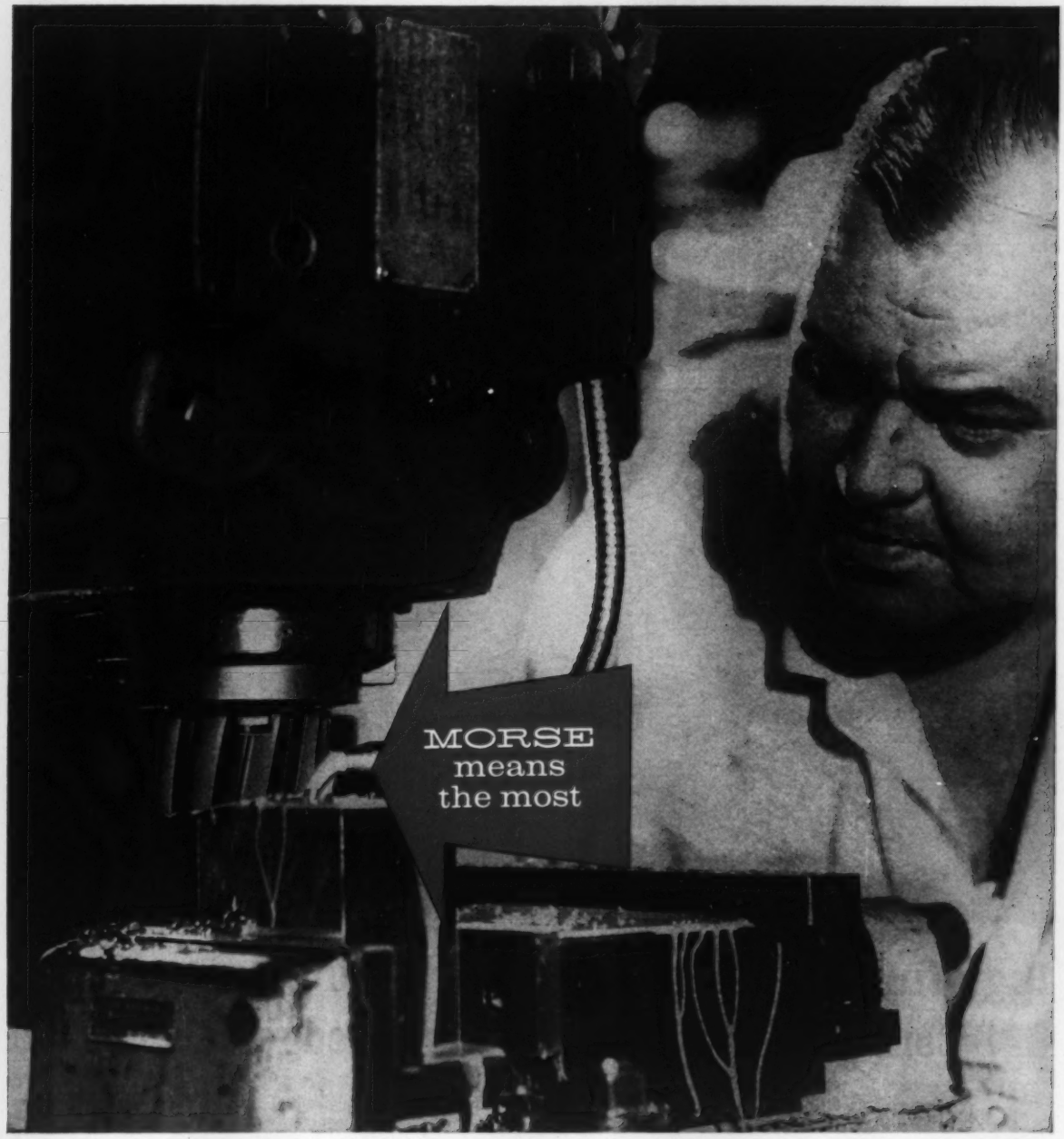

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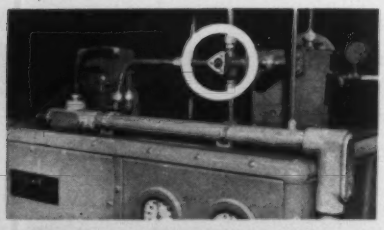
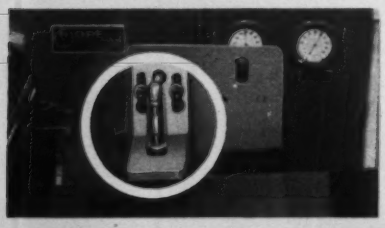


GPE CONTROLS ADJUSTABLE-GAIN BOOSTER — Even a slight error in strip position produces maximum corrective force with complete stability. A simple screwdriver adjustment matches the control system to your strip processing line. If it doesn't have this advanced feature, it's just not a modern strip guide!



NON-CONTACT, NON-CLOGGING SENSING HEAD — Nothing touches the gleaming surface of the strip but a breath of air! And only GPE Controls gives you precise, simple pneumatic sensing with patented non-clogging design. Maintains accuracy of control without excessive maintenance.

High-finish tinplate line at Granite City Steel uses GPE Controls Edge Guide for mirror-edge wind-up coil

This GPE Controls air-hydraulic strip guide – on the "B" Electrolytic Tin Line at Granite City Steel – is one of the four similar units now operating in this modern mill. And *three more* GPE Controls Strip Guiding Systems will soon be in operation.

Here at the wind-up, the line operates at about 1000 feet per minute. GPE Controls Strip Guide continuously positions the wind-up reel to produce a mirror-like metal edge on the wind-up coil. Tinplate quality is protected in handling and shipping because the coil edge is perfectly smooth!

Steelmakers and steel users alike have shown their preference for GPE Controls by making it the most widely used strip guide. For simplicity, for control accuracy, for construction that cuts maintenance to the bone—you can't beat GPE Controls!

Write for informative Bulletin EG84

GPE Controls, Inc.

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GPE Controls

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Automakers Look Harder at Materials

PRODUCERS of materials are fighting for stronger positions in the auto market. So you may see some shifts in usage in 1962 models.

The outlook: Galvanized and other coated steel may make some advances; plastics may show gains; zinc may win back some exterior trim applications from aluminum but will lose a few jobs to magnesium. Aluminum has made inroads into the engine market, and stainless steel may chalk up gains for brightwork on compacts.

Less conspicuous is the continuing shift to sheet steel for automotive stampings. Improved sheet quality and competition from other materials have caused strip usage to drop. AISI figures show that between 1955 and 1959 use of cold rolled sheets in the average vehicle increased by 100 lb. Shipments of hot rolled sheets were boosted 136 lb on a unit basis. Today's average vehicle requires 90 less pounds of hot and cold rolled strip than 1955 models. The 1960 shipment figures won't be available for another month, but they're expected to show an even greater increase in the use of sheets over strip. Strip producers are fighting back by offering heavier gages, more special tolerances, and significantly improved finishes.

Tubing shows a rise of 7 lb per unit, but bar shipments have declined 30 lb—mostly because of the shift away from screw machine parts for cars. The trend from coil to flat springs for automobile seats has been a factor in causing wire shipments to drop from 71 to 64 lb per vehicle.

Chevy's Leaf Springs

Design changes often spur the use of different materials. Chevrolet's H-35 senior compact will introduce a uniquely designed, single leaf rear spring that varies in width and thickness so that one spring will do the job of two or three leaf springs at a saving of 10 to 20 lb per car. What's most interesting is that steel mills will supply the material in semifinished form. Bethlehem Steel Co. is one of Chevrolet's suppliers. Its Livonia, Mich., spring and bumper plant will cut the material to length, curl eyes on each end, heat treat and shotpeen the parts to finish them.

The springs will be rolled on special mill equipment. They are narrow and thick in the center where loads are greatest but get wider and thinner at the ends. The mill price will reportedly be about 14 cents a pound.

The development is intriguing because GM only recently converted all its cars to full coil suspension. It means that instead of purchasing heavy wire stock for coils, Chevrolet suppliers will be buying conventional, hot rolled leaf spring stock. Engineers say the single springs work best on cars that weigh under 3000 lb. If the H-35 experiment is successful, GM may suggest tryouts on Oldsmobile and Buick compacts. Ford is planning on a similar type of spring that varies in thickness but not in width.

Coated Steels Advance

Metallizing and other types of spray-on finishes are being tried by automakers for truck cab roofs, dashboard sections, and kick panels. Lincoln Continental and Cadillac are using wood strips bonded to steel for ultraluxurious door panel moldings. But vinyl coated steels seem to be ahead of any of those combinations for 1962 usage since the material eliminates the need for surface finishing.

Industry consumption is hard to pin down, but Ford figures its 1961 usage averages 11 lb per unit for Thunderbird, Lincoln Continental, and station wagons. The figure should double in 1962. Typical applications include quarter trim panels around seats, station wagon tailgate cover panels, package trays, and pillar moldings.

Use of galvanized steels in corrosion prone underbody parts continues to grow rapidly. Rocker panels appear to be the most popular application. In 1955, the average vehicle required only 19 lb of galvanized steel. Consumption rose to 47 lb in 1959. Best estimates now put per car use at 67 lb. The

Where the Materials Are Vying

MAGNESIUM	—Fuel pumps
PLASTICS	—Instrument cluster housings & panels
VINYL COATED STEELS	—Interior trim parts
GALVANIZED	—Underbody parts
STAINLESS	—Mufflers & trim
ZINC	—Bezels & ornaments
ALUMINUM	—Engines

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average 1962 automobile is expected to use 80 lb.

Type 433 Stainless

Introduction of new grades of stainless steel that give brighter, harder finishes is helping the metal win back some of the trim applications it lost to aluminum (STEEL, Feb. 13, p. 145). Auto industry sources claim that Allegheny Ludlum Steel Corp. has developed a modified Type 430 stainless that is aimed specifically at the 1962 automotive molding strip market. Tentatively called 433, the new material reportedly contains 1 part molybdenum and 1 part copper to aid corrosion resistance and improve formability. Cost should be no more than regular 430 stock.

AISI figures show that the auto industry used an average of 42 lb of stainless on each 1959 car. "Trimless" compacts probably caused the drop, but carbuilders now find that buyers want more brightwork on economy cars, so 1961 usage should return to 1959 levels.

The industry expects an increase in stainless consumption in 1962 as producers crack the functional part market with mufflers. Thunderbird has them now, and Ford is expected to adopt them on another line next year (STEEL, Jan. 15, p. 51). Arvin Industries Inc., Columbus, Ind., is offering a replacement muffler that contains about 7 lb of MF-1 stainless.

• **Diffusion Coatings** — Working with a Detroit supplier, Chevrolet Div. is sprinkling stainless powder over carbon steel, then heating it, so the powder is diffused into the carbon steel. Objective: Muffler parts. The material is said to cost no more than aluminized steel and offers equal or better corrosion protection.

United States Steel Corp. is ready to try forming internal muffler parts from strip steel covered with a thin stainless skin. Organic adhesives are used for the bond. USS has tried similarly clad steel for bumpers.

Battle in Nonferrous

Magnesium will make a significant gain in 1962. AC Sparkplug Div. will diecast six types of magnesium fuel pump housings (it's running some this year). Jeep vehicles and Ramblers will be among the users too.

The oil filter base for several GM cars is another part that will be switched from aluminum to magnesium next year. So will the instrument cluster, backup plate for another model. Those (and a few more) applications admittedly are small, but they could double the automotive use of magnesium—estimated at less than 3 lb per car a few years ago. Dow Chemical Co.'s 2.5 per cent "developmental" pricing discount apparently is paying off. The company has claimed that standard production cars could use 80 lb of magnesium.

Zinc diecasting use on standard cars this year is 15 per cent higher than it was in 1960, says the American Zinc Institute. In 1962, it will seek to recover applications such as Ford taillight and headlamp bezels and exterior ornaments that have been sourced in aluminum. Industry adoption of new plating specifications is expected to improve corrosion resistance of chrome plated diecastings. The rapid growth of galvanized steel will also boost zinc's use on automobiles.

U. S. Auto Output

Passenger Only

	1961	1960
January	414,498	688,731
February	364,700†	659,323
March	.....	654,242
April	.....	582,909
May	.....	611,226
June	.....	613,147
July	.....	434,377
August	.....	305,527
September	.....	407,685
October	.....	617,816
November	.....	597,132
December	.....	522,239
Total	.....	6,694,354

Week Ended	1961	1960
Jan. 28	96,057	173,231
Feb. 4	100,589	164,027
Feb. 11	88,006	153,186
Feb. 18	76,523	158,898
Feb. 25	100,478†	153,501
Mar. 4	85,000*	138,513

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

Automotive consumption of aluminum in 1961 is estimated at 62.8 lb per car by Alcoa. It may decline slightly in 1962. Advances may partly hinge on some current research projects. Pontiac Div. has more than 80,000 dynamometer miles on a high silicon aluminum engine that has no gray iron liners. Division sources claim the biggest problem is developing a satisfactory grade of high silicon aluminum that won't conflict with proprietary formulas. Chevrolet Div. reportedly will return to an aluminum case for its new transmission next year. It dropped the aluminum housing on 1961 jobs.

Plastics Continue Inroads

Chrysler will use plastic instrument cluster housings on 1962 Valiants, Lancers, and maybe some Dodges. Reason given by industry tipsters: The material lends itself to vacuum metallizing more easily than zinc or magnesium. That permits more variety in finishes. The company has been considering switching to Cycolac, but Delrin's recent price cut may cause it to be retained.

The average 1961 car uses 22 lb of plastic to replace 150 lb of metal, claims William T. Cruse, executive vice president, Society of Plastics Industry, New York. That's double the amount used in 1953, but it's still less than the amount used in many European cars. Volkswagen uses 60 lb per car, Fiat about 26 lb. Outlook for 1962: An increase of 2 to 3 lb per car.

Recent applications that may be extended to other cars next year include metal molded, windshield washer pumps, polyethylene kick shields, and heater-defroster ducts. Rumor has it that Chevrolet is researching a reinforced plastic molded truck cab for one of its light jobs.

Smog Burner Road Tested

Chromalloy Corp. claims its new "smog burner" has cut by 97 per cent the smog-causing hydrocarbons and by 82 per cent the carbon monoxide of auto exhausts. Tests were made in Los Angeles on a 1955 car. The device is expected to sell for about $50.

HOB TWO FOR THE PRICE OF ONE

By switching to a lead-treated steel, Thor Power Tool Company cut the cost of these idler gears in half. Aristoloy 4620 (leaded*) provided high strength with excellent wear and shock resistance qualities. On gear cutting operations, machinability jumped from 35% to 66% (of B 1112). And there was a marked improvement in surface finish.

If you would like to know more about the production economies of lead-treated steels possible on hobbing, broaching, milling, and particularly automatic machining operations, write today for LEADED STEELS CATALOG. Or call your nearest Copperweld representative.

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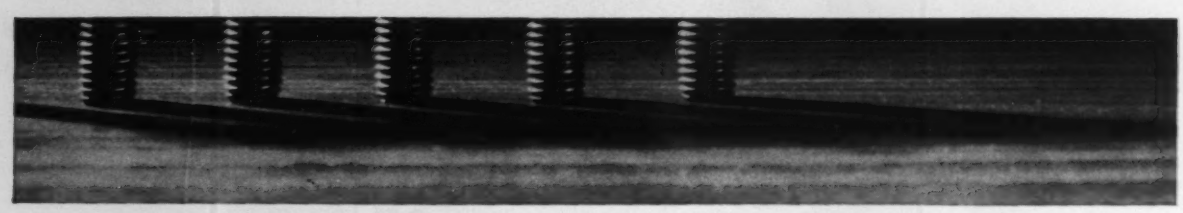


Fastener survey of blower units by RB&W points out where use of standard hex screws cuts costs, but not quality

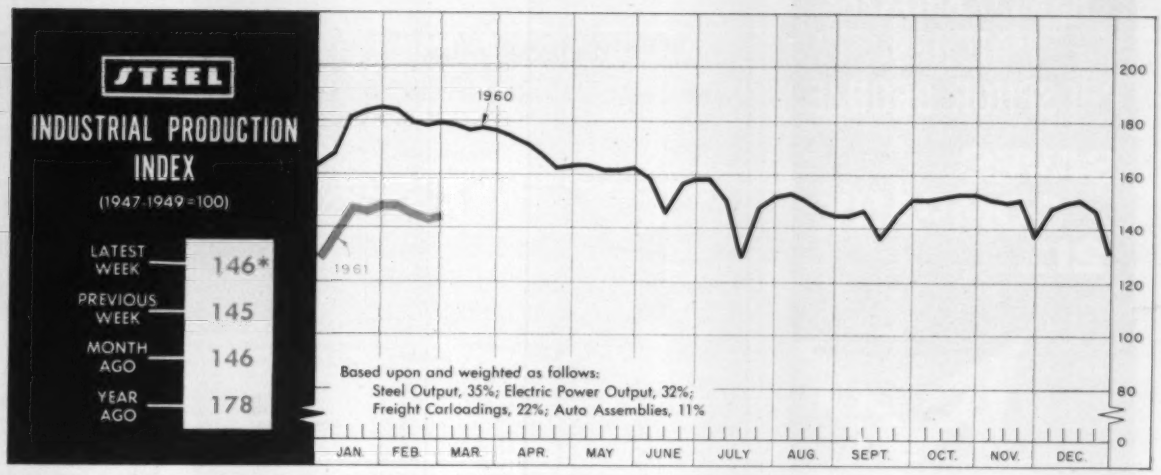
In making a survey of a well-known manufacturer's fastening operations, the RB&W man found that alloy socket head screws were used extensively in large blower units.

But he found no genuine engineering need – the alloy's strength wasn't being utilized. And he found no production need – there was no tight spacing situation that required internal wrenching. Nor was there even an *appearance* need – screws weren't being installed in countersunk holes for a flush fit.

So there was no purchasing need, either. Why pay the premium cost for alloy fasteners? He recommended switching to *standard* high strength hex screws. The savings in fasteners per blower: 50 dollars. That's 50 dollars added to unit *profit* with no increase in price.

An RB&W Fastener Expert is no better than your engineers. He simply knows *what* to look for. Why not let him search for savings with one of *your* engineers? Maybe you're doing the best possible; but unless you're sure you're not wasting fastener dollars, it pays to consult Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Sales office and warehouse at:** San Francisco, Calif. **Sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas. **Sales agents at:** Cleveland; Milwaukee; New Orleans; Denver; Fargo. **Distributors coast to coast.**



*Week ended Feb. 25.

Consumer Caution Blurs Outlook

THE PLEASANT break in the weather last month has turned many a businessman's fancy to thoughts of the annual spring upturn.

Just how lush the spring growth will be is anybody's guess. Consumer spending, which accounts for roughly two-thirds of our gross national product, was a stabilizing force in earlier postwar recessions. Right now, as would be expected in a period of declining production and lower income, consumers are reducing expenditures for goods, especially durable items, while maintaining their consumption of services. The trend isn't likely to be reversed before midyear.

● **Some Weak**—The Federal Reserve Board's latest survey of family buying intentions reveals: The proportion of families planning to buy new and used cars within the next six months is the same as it was in January, 1960. But the number expecting to purchase major appliances is substantially smaller than it was at this time last year. Only 4.8 per cent of the 17,000 respondents plan to buy homes in the next 12 months compared with 5.8 per cent last January.

● **Some Strong** — Nevertheless, about one-fourth say their incomes will be higher in 1961 than in 1960, about the same as in the two previous January surveys, and only 6 per cent, (unchanged from last year) think their incomes will be lower.

The survey results are typical of consumer attitudes found in polls taken during recessions. In fact, buying plans reported in January were stronger in several categories than they were in January, 1959, when the recovery from a slump was well advanced.

● **Retail Sales Slide** — But retail sales in January dipped for the third consecutive month. They

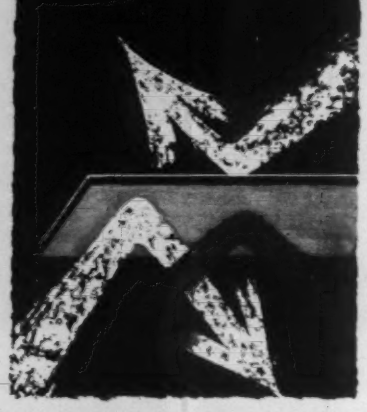
BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	1,560[1]	1,582	2,645
Electric Power Distributed (million kw-hr)	14,000[1]	14,315	14,092
Bituminous Coal Output (1000 tons)	7,350[1]	7,430	7,195
Crude Oil Production (daily avg—1000 bbl)	7,200[1]	7,167	7,318
Construction Volume (*ENR*—millions)	$397.2	$329.1	$307.8
Auto, Truck Output—U. S., Canada (*Ward's*)	129,930[1]	106,040	194,504
TRADE			
Freight Carloadings (1000 cars)	480[1]	502	553
Intercity Truck Tonnage (changes from year ago)	−6.3%	−7.3%	+2.9%
Business Failures (Dun & Bradstreet)	374	376	289
Currency in Circulation (millions)[2]	$31,857	$31,930	$31,562
Dept. Store Sales (changes from year ago)[2]	+7%	−3%	−2%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$25,931	$24,465	$22,276
Federal Gross Debt (billions)	$290.7	$290.3	$290.4
Bond Volume, NYSE (millions)	$29.0	$33.5	$23.3
Stocks Sales, NYSE (thousands of shares)	20,697	23,022	12,690
Loans & Investments (billions, adjusted)[3]	$109.8	$108.6	$101.6
U. S. Govt. Obligations Held (billions)[3]	$30.7	$30.3	$25.7
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	212.5	211.8	234.3
All Commodities[6]	120.0[1]	120.0	119.3
Commodities Other than Farm & Foods[6]	128.2[1]	128.2	128.6

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

BRMCO BRONZE MATCHES PHOSPHOR BRONZE

SAVES COMPANY 21%



Detch Electric Company cut material costs 21% by switching from phosphor bronze to BRMCO Bronze—and didn't sacrifice any necessary material characteristics. In fact, BRMCO Bronze ranked higher in uniformity, workability, and electrical conductivity. Its spring quality and corrosive resistance are excellent.

BRMCO Bronze, developed for the electrical and electronics industries, is suitable for most applications where phosphor bronze is used . . . *yet costs at least 15 cents a pound less!* Used mainly in the electrical field, it is also suitable for applications in other industries where its superior characteristics and lower cost are primary considerations.

Write or call today for testing samples and full specifications. If you phone, call EDison 7-4434 (Bridgeport — collect) and ask for Larry Hayden, field service department.

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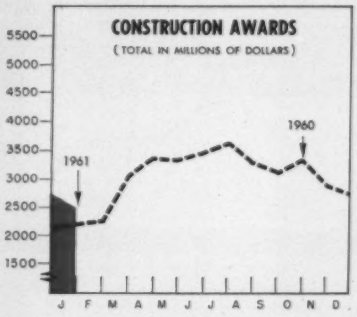
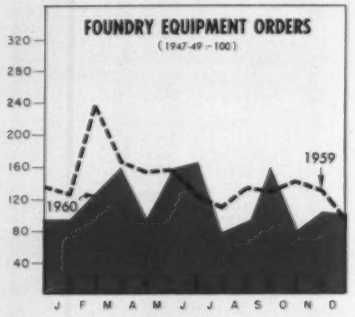
THE BUSINESS TREND





	Total 1961	Total 1960	Building 1961	Building 1960
Jan.	2,485	2,193	1,787	1,728
Feb.	....	2,240	....	1,685
Mar.	....	3,046	....	2,361
Apr.	....	3,360	....	2,527
May	....	3,337	....	2,563
June	....	3,472	....	2,593
July	....	3,597	....	2,481
Aug.	....	3,295	....	2,550
Sept.	....	3,119	....	2,402
Oct.	....	3,319	....	2,555
Nov.	....	2,886	....	2,169
Dec.	....	2,718	....	1,872
Totals	....	36,318*	....	27,345*

*Monthly figures do not add up to totals because of yearend revisions.
F. W. Dodge Corp.

	1960	1959	1958
Jan.	95.5	127.4	57.9
Feb.	128.6	237.1	57.6
Mar.	159.9	166.6	85.9
Apr.	97.9	154.2	88.7
May	159.0	157.0	136.1
June	164.8	125.1	87.7
July	80.0	119.7	77.9
Aug.	92.4	134.1	74.1
Sept.	158.1	131.3	64.5
Oct.	81.7	140.8	118.9
Nov.	106.5	131.2	83.3
Dec.	101.2	95.9	137.0
Avg	118.8	142.6	89.1

Foundry Equipment Mfrs. Assn.

Charts copyright, 1961, STEEL.

equaled $17.7 billion, a drop of 2 per cent from the previous month, yet only 6 per cent below the record set in April, 1960. Although the most recent drop took place in both the durable and nondurable goods groups, most of the decline in retail sales since April was experienced by durable goods stores. Their sales fell from $6.3 billion in April to $5.4 billion in January. Sales by nondurable goods stores, in contrast, were $12.2 billion in January as opposed to $12.6 billion in April.

• **From '60 Record**—Despite the downtrend toward the end of last year, record retail sales of $220 billion were racked up in 1960, a 2 per cent gain over 1959's. Sales by stores in the food group showed the greatest gains. Increases were also registered by stores in the general merchandise and apparel category, gasoline service stations, eating and drinking establishments.

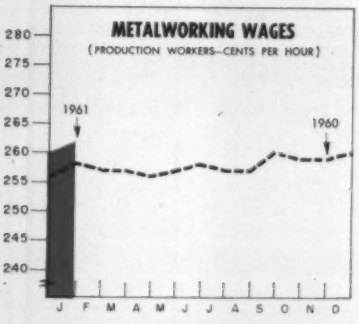
Among the durable goods outlets, the low rate of home construction in 1960 was reflected in a sharp drop in sales by lumber, building material, and hardware stores (which sell to builders as well as consumers), and in reduced receipts in the furniture, home furnishings, and appliance fields.

The greater volume of new car sales did not result in a proportional increase in dollar receipts, partly because of the wide acceptance of compact cars and a sharp drop in the price of used cars.

• **Income Up, Spending Down**—Another indication of the drop in the purchase of durable goods is seen in the decline of installment credit. Partly as a result of slower consumer credit, personal savings increased. Disposable personal income (after taxes) in 1960 was 5 per cent over 1959's—although it fell in November and December from October's all-time peak. But retail sales were only 2 per cent larger in dollar volume.

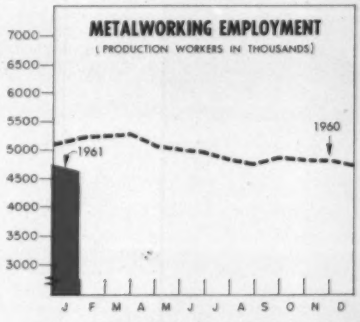
• **Some Cheer**—While the consumer remains cautious and the seller remains puzzled, there are some signs of cheer along the road into March. In the last reported week (ended Feb. 22), Dun & Bradstreet said retail trade was boosted appreciably over the previous week and moderately over the year ago level.

Steel production has generally



1960	Prim. Mtls.	Fab. Prod.	Machinery	Elec. Mchy.	Trans. Equip.
Jan.	287	245	255	228	276
Feb.	286	243	255	228	274
Mar.	285	243	256	228	273
Apr.	285	242	255	227	271
May	282	245	257	229	273
June	282	245	257	230	274
July	281	245	256	230	274
Aug.	280	246	256	230	275
Sept.	281	248	258	232	281
Oct.	281	248	258	232	281
Nov.	279	246	259	233	279
Dec.	283	247	260	233	279
1961					
Jan.	285	249	260	235	278

U. S. Bureau of Labor Statistics.



1960	Prim. Mtls.	Fab. Prod.	Machinery	Elec. Mchy.	Trans. Equip.
Jan.	1,048	857	1,179	892	1,239
Feb.	1,052	863	1,191	890	1,245
Mar.	1,043	954	1,186	879	1,221
Apr.	1,020	837	1,176	860	1,197
May	993	836	1,159	855	1,174
June	970	840	1,154	859	1,127
July	924	817	1,130	850	1,105
Aug.	910	819	1,112	861	1,036
Sept.	905	835	1,104	877	1,135
Oct.	891	834	1,087	839	1,119
Nov.	871	816	1,087	867	1,153
Dec.	855	801	1,075	854	1,139
1961					
Jan.	839	777	1,080	828	1,099

U. S. Bureau of Labor Statistics.

risen since the first of the year and remains above the November-December, 1960, level. Auto sales in the middle third of February were 11 per cent over those in the first third of the month. Dealers' new car stocks dropped for the first time this year.

Comparing Four Recessions

And while the old saying, "it could be worse," may be trite, the fact remains: It not only could be worse, but it was worse. Prentice-Hall Inc., Englewood Cliffs, N. J., has developed a table comparing the current slump with the previous recession years of 1948-49, 1953-54, and 1957-58. It shows the peak-to-trough percentage decline in major market groups and industries.

In the present setback, only steel is suffering more than it did in the previous downturns. Prentice-Hall says automotive and home goods are in the second most severe period. The remaining groups are experiencing the mildest ill effects (or second mildest) of the four recession periods. (Relative severity is based on unrounded figures.)

Used Machine Sales Jump

The index of used machine tool sales shot up to 126.5 in January compared with 87.8 in December. Dollar sales rose 44 per cent above December's.

Peak-to-Trough Percentage Decline

	1960-61	1957-58	1953-54	1948-49
Food & apparel	3%	3%	3%	12%
Business equipment	5%	22%	16%	22%
Consumer goods	6%	7%	7%	4%
Chemicals, petroleum & rubber	7%	10%	7%	8%
Machinery	9%	23%	17%	15%
Total manufacturing	10%	15%	11%	9%
Materials	11%	18%	12%	12%
Construction materials	11%	16%	8%	13%
Automotive and home goods	18%	23%	18%	14%
Steel	46%	44%	38%	32%

Capacability means

Convenience

When it comes to ramming refractories, *convenience* is Basic. And, it pays to let Basic's magnesia ramming refractories, RAMSET and RAMICLASE, be your "ace in the hole" when schedules are tight. For quick, dependable bottom installations, they can't be beat.

In the 20 years since their introduction, RAMSET and RAMICLASE have become the standard of comparison for open hearth and electric furnace bottoms. For the best possible job, Basic furnishes special mixers, conveyors, rammers and other equipment to speed installation and reduce labor costs.

If you use basic refractories, you can depend on Basic's *capacity* and *ability*. Write for 24-page booklet outlining application of Basic's more than thirty dead-burned dolomites, ramming and gunning refractories, patching materials and tar-bonded linings for basic oxygen furnaces.

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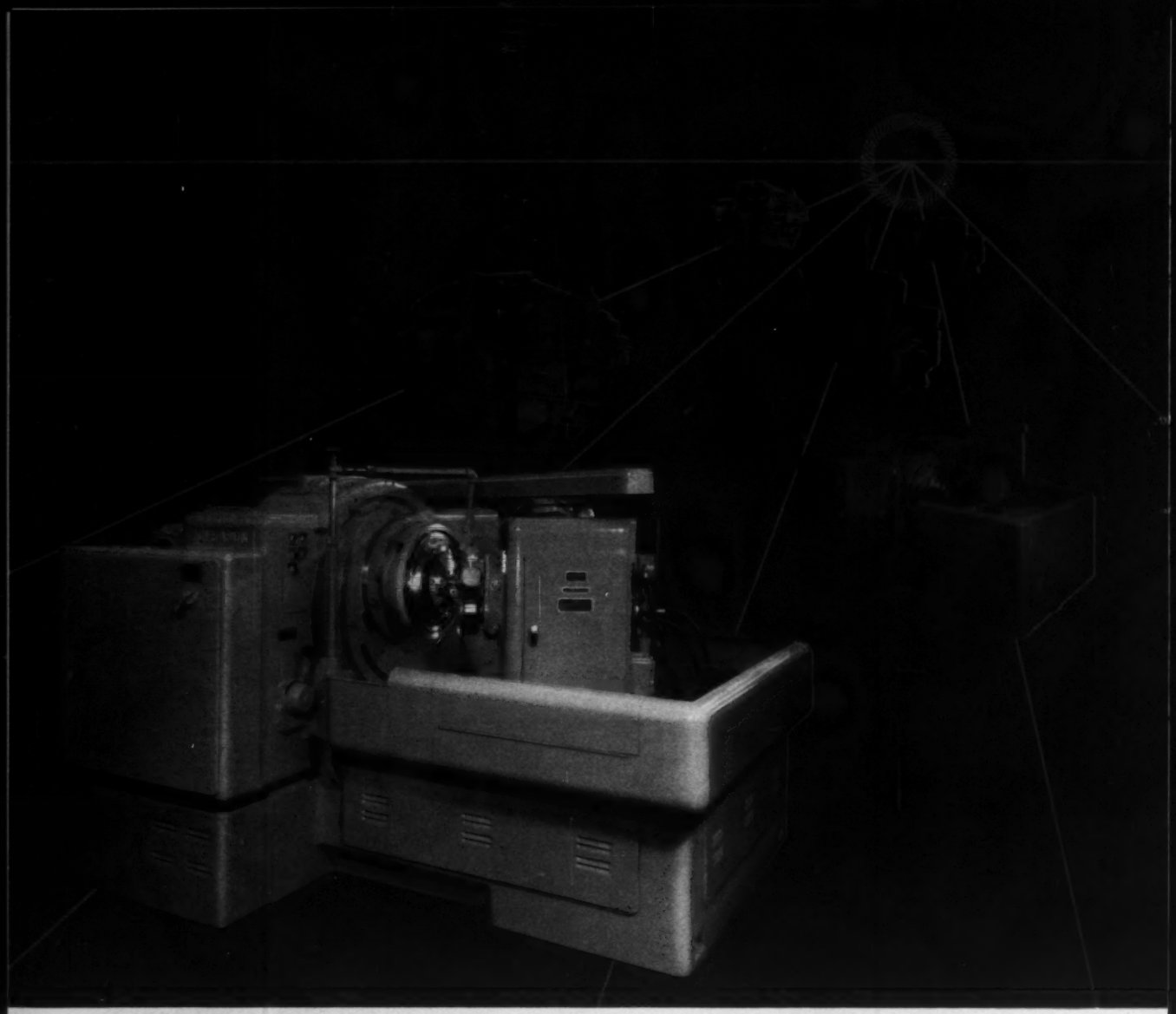
CLEVELAND 15, OHIO



Now . . . one machine does the work of five!

For small production runs—here's *one* gear-cutting machine with the flexibility of *five!*

The Gleason No. 118 Hypoid Generator roughs and finishes both gears and pinions—using four cutting methods that formerly required a battery of five machines. When production requirements increase, you simply add other machines, the 118 becoming a specialized member of your production team.

1. Single-Cycle® Method. Using this method, you can cut nongenerated gears four to five times faster than previously possible on machines of this type. Cradle and work head are locked in position. The last rotation of the Single-Cycle Cutter finishes both sides of a tooth space. You cut the mating pinions on the same machine, using the conventional single-roll generating method.

2. Cyclex® Method. For certain applications you can use the extremely fast Cyclex Method on the No. 108 Generator. You cut nongenerated gears in one completing operation from the solid blank.

3. Generated Gears and Pinions. You can produce both gears and pinions on this machine with the generating method. Here, a relative rolling motion takes place between gear or pinion and the rotating cutter. Once the gear is chucked in the work head, the machine operation is entirely automatic.

4. Unitool* Method. If you want to cut small quantities of spiral bevel, Zerol® bevel, or hypoid gears with a minimum of tooling, you can use the Unitool Method. You cut both gears and pinions with a single cutter. This method is particularly useful for experimental gears for prototype work.

*Trademark

The No. 118 Hypoid Generator handles gears up to 18″ diameter at a 10:1 ratio, to a *maximum* coarseness of 2 DP. For production of smaller gears, the No. 108 Generator cuts gears up to 8½″ diameter at a 10:1 ratio and to 4 DP. A third model, the No. 28 Hypoid Generator, cuts gears up to 33″ diameter at a 10:1 ratio, 1½ DP.

For complete information, send for bulletins on all three machines.

GLEASON WORKS

1000 UNIVERSITY AVE., ROCHESTER 3, N.Y.

CLARE HELLENBERG
Racine Hydraulics div. mgr.

GLENN H. FITCH
Enamelstrip gen. mgr.

CHARLES J. BROWN
J&L div. exec. v. p.

ROBERT J. HEGGIE
A. M. Castle president

Clare Hellenberg was made manager, Mobile Hydraulic Div., **Racine Hydraulics & Machinery Inc.**, Racine, Wis. He continues as division chief engineer.

Glenn H. Fitch was made general manager, **Enamelstrip Corp.**, Allentown, Pa., to succeed **Arthur E. Uhleen**, resigned. Mr. Fitch was sales manager-organic products for Enamelstrip, a subsidiary of National Steel Corp.

Charles F. Marschner was made manager, fastener development, for **Huck Mfg. Co.**, Detroit. He will direct research laboratory activities, as well as development and project engineering.

William A. Dorff was made chief engineer, **May-Fran Mfg. Co.**, Cleveland, division of Fischer & Associates Inc.

John D. Goodall joined **Industrial Tectonics Inc.** as general manager of its Ball Div., Ann Arbor, Mich. He succeeds **Helmut F. Stern**, who remains as president of both the Ball and Bearing Divisions.

Robert S. Bollin, chief engineer, was made plant manager at **Toledo Pipe Threading Machine Co.**, Toledo, Ohio.

Gould-National Batteries Inc. promoted **A. W. Brunsell** from general sales manager-Nicad Div. to vice president-alkaline sales. He remains at St. Paul executive offices. **Donald J. Nedved**, was made vice president-sealed cell operations.

Charles J. Brown was named to the new post of executive vice president, Stainless & Strip Div., Detroit, **Jones & Laughlin Steel Corp.** He was vice president of Freeport Nickel Co., subsidiary of Freeport Sulphur Co.

Charles W. Schuck was elected executive vice president, **Braeburn Alloy Steel Corp.**, Braeburn, Pa., subsidiary of Continental Copper & Steel Industries Inc.

James L. Elliott Jr. was made director of purchasing at **AC Spark Plug Div.**, Flint, Mich., General Motors Corp. He is succeeded as director of production engineering by **John R. Wilson Jr.** Mr. Elliott succeeds **Joseph K. Decker**, recently named equipment sales manager at AC.

J. B. Driscoll was named manager of production for **Electric Autolite Co.**'s new plant at Decatur, Ala.

Edward W. Guion was made assistant manager-fabricated products for **Quaker State Metals Co.**, Lancaster, Pa., division of Howe Sound Co.

Thomas J. Marshall fills the new post of director of market research and planning at **Federal-Mogul-Bower Bearings Inc.**, Detroit. He is replaced by **H. H. Kietzer** as sales manager, Federal-Mogul Div.

Stephens-Adamson Mfg. Co., Aurora, Ill., elected **Donald L. Stephens** (executive vice president) president to succeed his father, **L. S. Stephens**, now chairman.

Robert J. Heggie was elected president of **A. M. Castle & Co.**, Franklin Park, Ill. He was vice president-general manager. He succeeds **John M. Simpson**, now chairman. **Norman L. Jones** was elected vice president, Western districts; **Andrew J. Kemp** vice president, Middle West and Eastern districts.

William C. Smith was made product manager, **U. S. Expansion Bolt Co.**, York, Pa.

Hubert A. Bernet Jr. was made sales manager-engineering, **Webster Mfg. Inc.**, Tiffin, Ohio.

Richard M. Gregory was made West Coast manager, Federal Foundry Supply Div., **Archer-Daniels-Midland Co.**, Los Angeles.

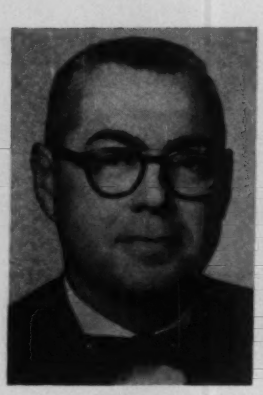
E. F. Olson was made sales manager, Contract Mfg. Div., **Cutler Metal Products Co.**, Camden, N. J.

James S. Hetherington joined **Richard D. Brew & Co. Inc.**, Concord, N. H., as engineering manager of its Vacuum Furnace Div. He was with Alloyd Corp.

John Ross was named manager, Research & Development Dept., **Metals & Controls Inc.**, Attleboro, Mass., corporate division of Texas Instruments Inc.

A. E. R. Peterka, retired executive of Lamson & Sessions Co., was elected chairman of **Adams Supply Co.**, Los Angeles.

Raymond E. Jones was promoted from general sales manager to vice



WILLIAM T. HADDON

GEORGE G. KARIAN

Alan Wood Steel general managers

EUGENE L. MACKEY

ELMER A. KOENIG

Yoder Co. vice presidents

president-sales of **Matthews Corp.**, Hawthorne, Calif.

Alan Wood Steel Co., Conshohocken, Pa., appointed **William T. Haddon** general manager, steel sales; **George G. Karian** general manager, Iron Powder Div., with responsibility for production and sales. **J. Frederic Land** was promoted to assistant vice president-marketing, to act in an advisory capacity until retirement at the end of March.

Elbert J. Brandt was made general manager, **Universal Dynamics Div.**, Acoustica Associates Inc., at Santa Barbara, Calif.

John F. Price was made sales manager of **Consolidated Aluminum Corp.**, New York. He was product manager, Foil Div., at the company's plant at Jackson, Tenn.

Alfred H. Macgillivray was made works manager, **Rockbestos Wire & Cable Co.**, New Haven, Conn., division of Cerro Corp. He was production manager.

Yoder Co., Cleveland, appointed **Eugene L. Mackey** vice president-engineering; **Elmer A. Koenig** vice president - sales; **Theodore R. Stroomer** sales manager.

C. W. McDaniel was made director of sales, **Fostoria Corp.**, Fostoria, Ohio.

L. Wayne Mullane was made vice president, Downey, Calif., plant, **Aerojet-General Corp.**

Robert M. Miller was made assistant sales manager, Machine Tool Div., **DeVlieg Machine Co.**, Royal Oak, Mich.

Edward N. Harris was elected vice president-sales, **Bohn Aluminum & Brass Corp.**, Detroit. Associated with Bohn since 1953, he most recently was plant manager of Plant No. 12 in South Haven, Mich.

Jan Bleeksma was appointed vice president-manufacturing, **Amperex Electronic Corp.**, Hicksville, N. Y., subsidiary of North American Philips Co. He was plant manager.

Everett S. Winslow, plant superintendent at **Consolidated Diesel Electric Corp.**, Stamford, Conn., was named superintendent of Condec's new assembly plant in Schenectady, N. Y.

Motor Wheel Corp. created four new divisions within its Lansing, Mich., plant. Appointed general managers of the divisions are: **John H. Golata**, Passenger Car Hub & Drum Mfg. Div.; **John D. Kaiser**, Truck Hub & Drum Mfg. Div.; **Milton H. Grams**, Passenger Car Wheel Mfg. Div.; and **Herbert H. McKeague**, Agricultural & Industrial & Special Products Div. **Irving R. Dedow Jr.** succeeds Mr. McKeague as director of material control, retaining the title of director of purchasing.

D. L. Robertson was named executive vice president, **Apex Steel Corp. Ltd.**, Los Angeles. Formerly vice president, he will continue as gen-

ALFRED H. MACGILLIVRAY

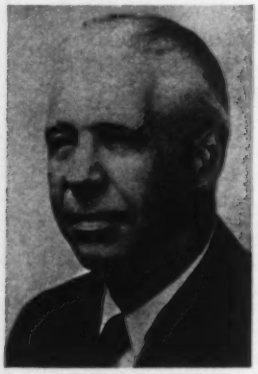
Rockbestos Wire works mgr.

EDWARD N. HARRIS

Bohn Aluminum v. p.-sales

JAN BLEEKSMA

Amperex mfg. v. p.



D. L. ROBERTSON

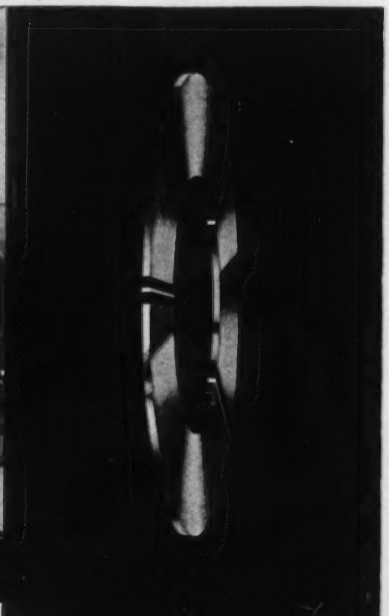
Apex Steel exec. v. p.

Careful And Costly Control Grooms

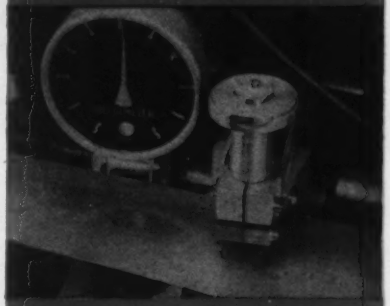
SANDVIK SPRING STEELS

FOR SPECIAL PERFORMANCE

Smoothness of strip surface is checked with a "Talysurf" surface measuring instrument which registers the profile depth magnified up to 50,000 times.



Sandvik laboratories carry out over 200,000 chemical analyses a year.



Strip thickness is checked during rolling and at final inspection with a "Deltameter"

Sandvik spends extra time, money and effort to produce spring steels with the quality to meet difficult performance demands.

From the ore in Sandvik's mines to the finished strip, Sandvik applies constant, rigid quality control to every steel-making step. Special analyses, careful, small-lot processing, modern laboratories equipped with special scientific instruments . . . these are behind Sandvik's record of success in tough spring steel applications.

For special physical properties plus accurate and uniform flatness, straightness, width, gauge and edge finish, specify Sandvik. Wide variety of qualities and sizes in stock plus local Sandvik facilities for custom-processing and finishing to your requirements. Send for free brochure.

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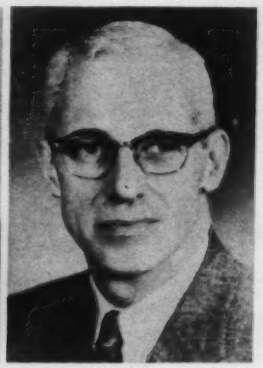
***Works:* Sandviken, Sweden**

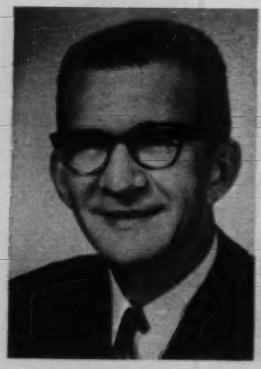
SS-203

W. J. RAVE
heads Dow's Metal Dept.

GORDON MOOS
Spiron-Fastener Div. v. p.



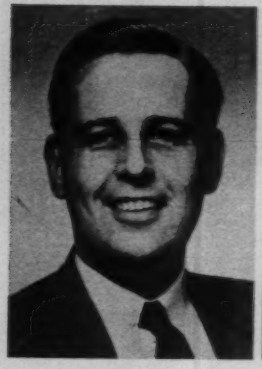
WILLIAM SIVYER
Chain Belt group v. p.



KENNETH C. DORLAND
Union Metal gen. sales mgr.

HERBERT E. BRUMDER
Pressed Steel Tank pres.

THOMAS W. CLARK
Threadwell president



RAY HEIZER
Gisholt Plastics sales

EDWARD P. FISHER
Osborn finishing machine sales

JOHN KUSHAN
Hickok dir.-material

eral manager of the Foundry and Machine Press Divisions.

Ray Heizer was made general sales manager for **Gisholt Plastics**, Madison, Wis., Gisholt Machine Co.

Edward P. Fisher was made manager, finishing machine sales, **Osborn Mfg. Co.**, Cleveland. He was assistant manager-industrial sales.

John Kushan, former production control manager, was appointed director of material (purchasing and production planning) for **Hickok Electrical Instrument Co.**, Cleveland.

J. Alan Stewart was made assistant general manager, **Sparton Electronics Div.**, Sparton Corp., Jackson, Mich.

W. J. Rave was named manager of the newly formed Metals Dept. of **Dow Chemical Co.**, Midland, Mich. He was manager of magnesium production at the Texas Div. **Hilary A. Humble** was made sales manager, Metals Dept.

Gordon Moos was elected vice president, Fastener Div., **Spiron Inc.**, Silver Spring, Md. He was assistant to the vice president-sales and production for Waldes Kohinoor Inc.

Chain Belt Co., Milwaukee, appointed **William Sivyer** to the new post of vice president-Engineered Equipment Group; and **Harold M. Weil** manager, Conveyor & Process Equipment Div. Mr. Sivyer has executive responsibility for the Conveyor & Process Equipment Div., Milwaukee, and the Carrier Div., Louisville.

Kenneth C. Dorland was made general sales manager, **Union Metal Mfg. Co.**, Canton, Ohio. He succeeds the late **Louis F. Heckmann**, former vice president-sales.

Herbert E. Brumder was elected president, **Pressed Steel Tank Co.**, Milwaukee, to succeed **Herman Merker**, now chairman. **W. L. Killen** succeeds Mr. Brumder as vice president-manufacturing and engineering. Mr. Brumder is president of Downingtown Iron Works Inc., subsidiary at Downingtown, Pa.

Thomas W. Clark was named president and general manager, **Threadwell Tap & Die Co.**, Greenfield, Mass., subsidiary of Sheffield Corp. Formerly a vice president, he replaces **Roy Heldenbrand**, promoted to vice president-operations at Sheffield, a subsidiary of Bendix Corp.

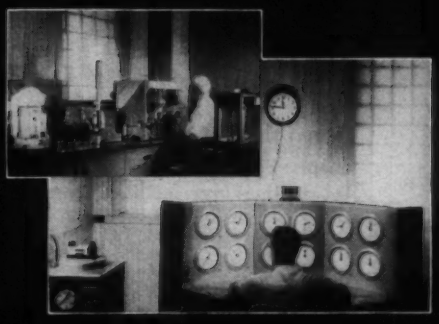
OBITUARIES...

W. W. Heilman, 41, manager of the Niagara Falls, N. Y., plant of **Union Carbide Metals Co.**, died Feb. 14.

M. E. Stewart, 50, chief metallurgist, **Wells Mfg. Co.**, Skokie, Ill., died Feb. 21.

. . . add our manpower to this picture

Your orders are processed and expedited from this general office and plant administration building.



Metallurgical quality control with complete modern testing methods precedes and follows every job from order entry to shipping dock.

Electric furnace steel poured to the vacuum stream degassing chambers meets the most critical specifications for steel components.

The 3000 ton "squeeze" starts a 90 inch x 120 ton ingot on its way to become a forged steel turbine rotor, a diesel crankshaft, a ship's drive shafting.

Steel Castings to 400,000# are pulled from the sand in these new modern foundries.

Modern facilities in our 260,000 square feet of machine shops serve our steel foundries and forge shops.

STEEL FORGINGS FOR...

- Diesel Crankshafts
- Connecting Rods
- Ship's Shafting
- Turbine Rotors
- Bending Rolls
- Rolling Mills
- Industrial Presses
- Steam Hammers

STEEL CASTINGS FOR...

- Steam Hammers
- Ship's Components
- Rolling Mills
- Industrial Presses
- Turbines
- Hydro-electric Engines
- Crushers
- Cement Plant Equipment

Ingots for manufacturers who do not make their own steel.

ERIE FORGE & STEEL CORPORATION

ERIE, PENNSYLVANIA

Sparrows Point Gets Oxygen And Tar Distillation Plants

BETHLEHEM STEEL CO., Bethlehem, Pa., continues to improve its steelmaking facilities and to strengthen its position in the coal-tar chemical field.

• **Oxygen Plant** — Air Products Inc., Allentown, Pa., is erecting a $6 million oxygen-nitrogen producing facility at Sparrows Point, Md. When it's completed at midyear, it will supply (daily) 350 tons of high purity oxygen and 450 tons of high purity nitrogen to Bethlehem's Sparrows Point Works. The facility will produce oxygen and nitrogen in liquid and gaseous forms.

The oxygen will be injected into the open hearth furnaces through roof lances. The nitrogen will be used for sheet steel annealing operations in the mill.

The plant (built, owned, and operated by Air Products) will also supply Bethlehem's Steelton (Pa.) plant 100 miles away. Liquid oxygen will be transported in over-the-road trailers and converted into gaseous oxygen for use in the steelmaking and steel fabricating shops at Steelton.

• **Distillation Plant** — Preliminary arrangements have been completed between Bethlehem Steel and Allied Chemical Corp., New York, for the erection of a large tar distillation plant at Sparrows Point. The unit will recover chemicals from coke oven tar for processing in Allied's facilities in Philadelphia. The plant will have an annual capacity to process more than 50 million gallons of tar. The product: More than 42 million lb of a chemical fraction containing crude naphthalene. The plant also will produce valuable tar acids. First production is scheduled to reach the market late this year.

Adds Annealing Line

The second, continuous cleaning and annealing line has been placed in operation in the Tin Plate Dept. at Weirton Steel Co., Weirton, W. Va., division of National Steel Corp. The new line handles 60,000 lb coils of cold rolled strip steel up to 45 in. wide in tin plate gages and operates at speeds up to 2000 fpm. It can clean and anneal 60 tons of strip an hour for tin plating.

Kaiser Opens Gary Plant

A new coke-calcining plant at Gary, Ind., for Kaiser Aluminum & Chemical Corp., Oakland, Calif., has gone into operation. The plant calcines petroleum coke for use in the manufacture of carbon electrodes for the reduction of cells in Kaiser Aluminum's primary reduction plants. The Gary installation includes a 180 ft rotary kiln and related handling facilities. It has an annual capacity for calcining about 120,000 tons of coke.

Acquires Beryl Deposit

Standard Beryllium Corp., New York, purchased the Boa Vista concession (more than 1700 acres) in Brazil. Boa Vista's proven reserves of beryl amount to 2.1 million tons. Total indicated reserves amount to 14,820,000 tons. Assays indicate an average of 3 per cent beryl for the area. Standard Beryllium plans to install an automated mill shortly to extract beryl and other minerals. At least one more, and possibly two more mills, will be put into operation before the end of 1961.

Firms Change Designations

Minneapolis-Moline Co., Hopkins, Minn., changed its name to Motec Industries Inc. to reflect the company's diversified activities. Divisions include: Farm Equipment, Mobilift Materals Handling Equipment, Mopower Construction Equipment, Molectronics, Mohawk Foundry & Forge, Moline Automotive, Motec Engineering, Motec International, Mocraft Power Tool, and Pioneer Equipment Finance Co.

Kaiser Refractories & Chemicals Div., Kaiser Aluminum & Chemical Corp., changed the names of two of its sales subsidiaries to that of the parent organization. Fire Brick Service Co., Indianapolis, and Fire Brick Specialties Co., Rock Island, Ill., are operating under the name of Kaiser Refractories & Chemicals and as district sales offices. F. B. Boyd Jr. continues as sales manager at Indianapolis, F. M. Moser at Rock Island.

Scope Inc. Organized

Scope Inc. has established a plant at 10 Jefferson Ave., Woburn (Boston), Mass. Jason Saunderson is president of the new firm. Other founders are: Eliot DuBois, engineering; Henry Levesque, sales; and Paul Hutchinson, treasurer. The firm will make analytical instruments and offer consultative services.

U. S. Steel Buys Furnace

U. S. Steel Corp., Pittsburgh, awarded a contract to Salem-Brosius Inc., that city, for the construction of a controlled atmosphere type car furnace. It will be installed at the corporation's McDonald (Ohio) Works. Each of the two cars servicing the furnace is designed to handle bars and strip in loads up to 20 tons. The cars are hooded in the furnace, and the work is heated in a nitrogen atmosphere.

Steelmaker Splits Dept.

Electro-Mechanisms Dept., General Engineering Div., Allegheny Ludlum Steel Corp., Pittsburgh, now comprises two sections. Joseph J. Kasecky has been appointed supervising engineer of the Application Section; Jack W. Skinner, Design & Construction Section. Both men are stationed at the firm's Brackenridge (Pa.) Works and report to J. B. Murtland Jr., manager of the Electro-Mechanisms Dept.

TRW Consolidates Units

Thompson Ramo Wooldridge Inc., Cleveland, consolidated the Power Systems and Fluid Systems works of the Tapco Group into a single production operation. J. B. Crobaugh, former Power Systems works manager, will head the com-

bined manufacturing operations team. J. W. Davidson, former Electronics works manager, serves as assistant operations manager. Sales effort of the group continues under J. H. Shaffer, vice president.

Armco Enlarges Facilities

Sheffield Div., Kansas City, Mo., of Armco Steel Corp., awarded a contract to Salem-Brosius Inc., Pittsburgh, for the construction of a 155 ton per hour, pusher type, slab heating furnace and 16 soaking pits arranged in four batteries. The installation will be made at the division's plant in Houston. The furnace will heat slabs that will be rolled into plates on a new mill. Each soaking pit is rated to hold a charge of 180 tons.

Dow Forms Metal Dept.

Dow Chemical Co., Midland, Mich., has formed a Metals Dept. which will be responsible for Dow activities in magnesium and other primary metals. Manager of the new department is W. J. Rave; sales manager, H. A. Humble. The new department has no connection with Dow Metal Products Co.—a division which remains responsible for the processing and fabrication of aluminum, magnesium, and other mill products.

Fairmont Installs Furnace

Fairmont Aluminum Co., Fairmont, W. Va., is installing a gas fired, annealing furnace designed to accommodate coils of aluminum up to 73 in. wide. The furnace will have a capacity of 133,600 lb. The facility will cost about $203,000 and is part of the firm's $10 million plant expansion and modernization program. The annealing unit is being erected by Swindell-Dressler Corp., Pittsburgh, a subsidiary of Pullman Inc. Fairmont Aluminum is a subsidiary of Cerro Corp., New York.

ASSOCIATIONS

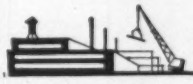
Aluminum Association, New York, elected these officers: President, J. W. Douglas, Republic Foil Inc., Danbury, Conn.; chairman, M. M. Anderson, Aluminum Co. of America, Pittsburgh; honorary chairman, A. V. Davis. Vice presidents are: R. L. Allen, Bridgeport Brass Co., Bridgeport, Conn.; Mord Lewis, Anaconda Aluminum Co., Louisville; and N. H. Collisson, Olin Mathieson Chemical Corp., New York.

Society of Die Casting Engineers, Detroit, elected these officers: President, J. L. MacLaren, Aluminium Ltd. Sales Inc., New York; vice president, E. W. Rearwin, Package Machinery Co., East Longmeadow, Mass.; secretary, M. R. Tenenbaum, Lester-Phoenix Inc., Cleveland; and treasurer, L. G. Axford, Ford Motor Co., Dearborn, Mich.

CONSOLIDATIONS

Midland-Ross Corp. and **Industrial Rayon Corp.,** Cleveland, will merge, subject to approval of stockholders. If the consolidation is approved, Industrial Rayon will operate as a division of Midland-Ross. F. L. Bissinger will be elected a vice president and Midland-Ross will continue to head Industrial Rayon activities.

Kaiser Aluminum & Chemical Corp., Oakland, Calif., and **Kawneer Co.,** Niles, Mich., will merge, subject to approval of stockholders. Kawneer's principal business is manufacturing aluminum architectural products. L. J. Plym, president of Kawneer, will become president of the Kawneer Div.



NEW PLANTS

Bell & Gossett Co., Morton Grove, Ill., completed construction of a 32,000 sq ft building to be used for the manufacture of air conditioning and refrigeration equipment. Cost: $500,000.

New Hampshire Ball Bearings Inc., Peterborough, N. H., will build an 18,000 sq ft plant in Laconia, N. H. The facility, for production of instrument ball bearings, will be managed by Richard Cilley. Cost (including machinery and equipment): $750,000.

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Savings

When it comes to gun refractories, *saving* is Basic. You can "sock away" time and money with Basic's BRI GUN and gun refractories such as GUNDOL and GUNMIX . . . keys to easier, faster, less costly furnace maintenance.

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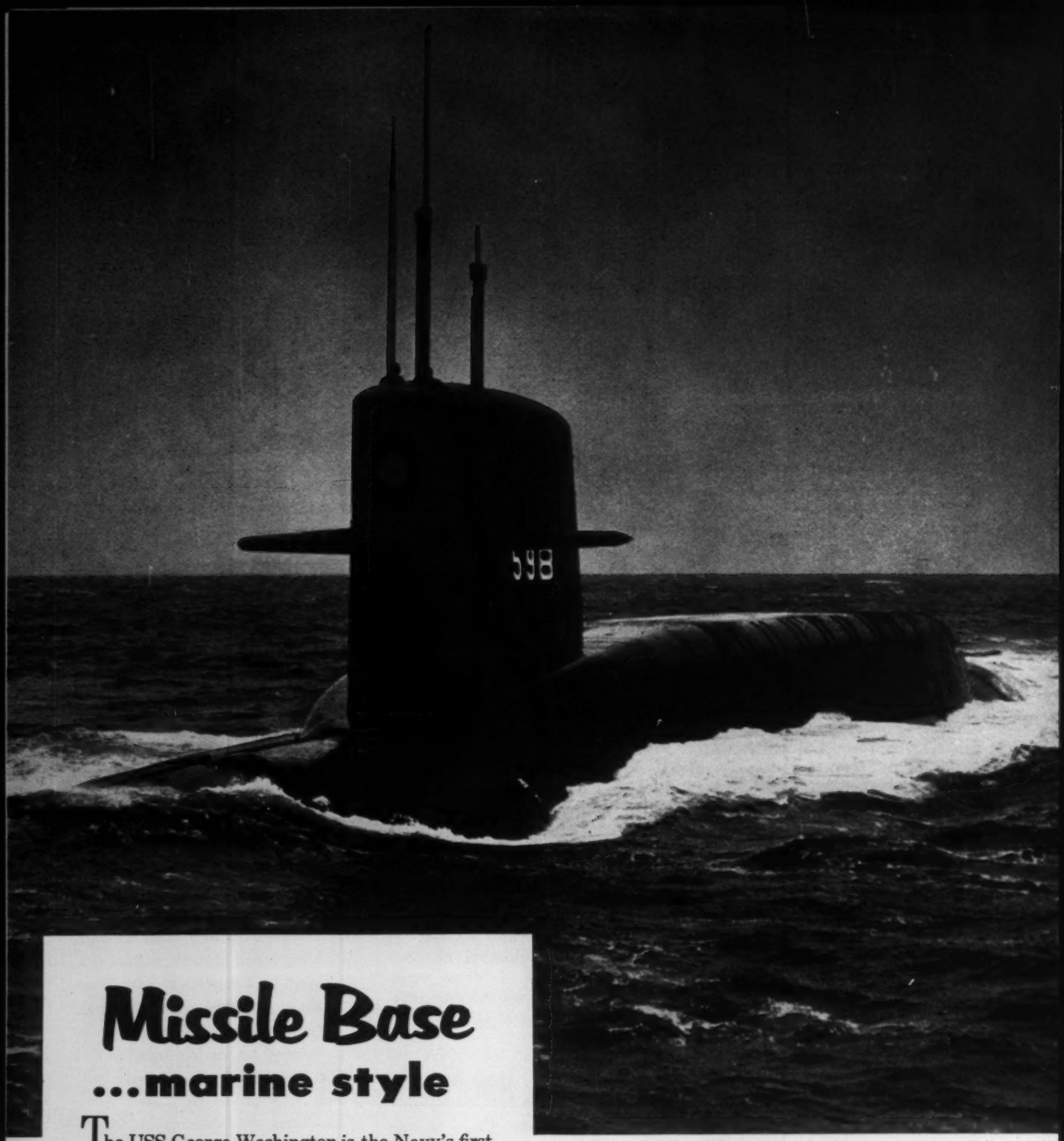

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IMPROVED STAINLESS—A new Type 433 stainless with additions of molybdenum and copper has been developed for automotive trim, states Allegheny Ludlum Steel Corp., Pittsburgh. Main advantage: Better corrosion resistance. Auto firms are testing the alloy.

FIGHTING CORROSION—Diffusion coating carbon steel with stainless holds promise for muffler parts, thinks General Motors Corp., Detroit. It is sprinkling stainless steel powder on cold rolled carbon strip which is then heat treated. Cost: A little less than aluminized steel. Corrosion resistance is said to be equal or better, the company reports.

MORE ON CORROSION—The cost of corrosion resisting materials can be improved by laminating a stainless skin on a carbon steel base. U. S. Steel Corp., for example, has a product bonded with an organic adhesive that's being given forming tests for auto muffler parts. A similar laminate is being evaluated for bumpers.

HOT WIRE INSULATOR—A search for better insulating materials for electric wire turned up a frit-resin combination that is effective at 800° F, claim K. N. Harris and J. D. Walton Jr., Georgia Institute of Technology, Atlanta. You can get details from PB 161788, OTS, Department of Commerce, Washington 25, D. C.

SOLAR ENGINE ADVANCES—Current work on a 15,000 watt engine powered by sunlight employs rubidium heated to 1200° F, superheated to 1750° F at 10 psi to power a multistage turbine. Construction utilizes high nickel alloys, Inconel, and some 300 series stainless steels.

TITANIUM PROPERTIES FORECAST—A method described as economical and time saving accurately predicts mechanical properties of heat treated, titanium alloy forgings, claim C. F. Hickey and L. S. Croan, of the Army's Watertown Arsenal, Watertown, Mass. By controlling the cooling rate of a thin test coupon, you can duplicate cooling rate in heavy sections and calculate the expected mechanical properties. Other alloys, both ferrous and nonferrous, would probably respond to a similar approach, the Army men say.

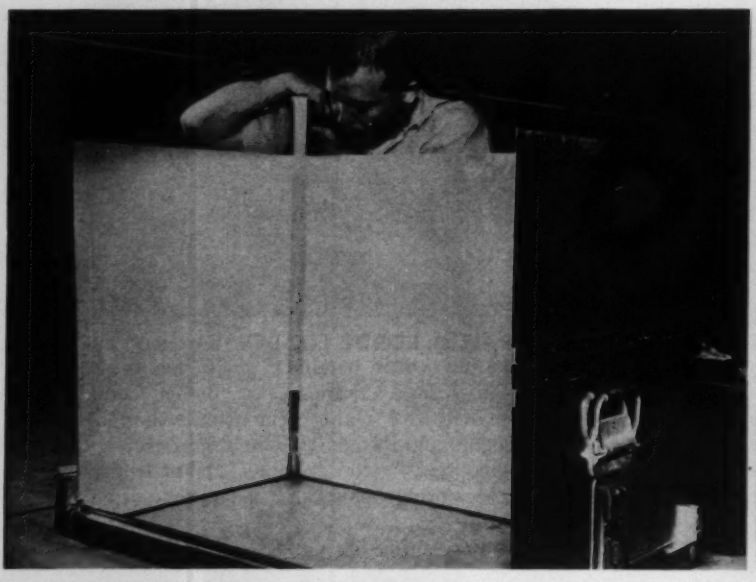
TEMPERATURE MEASURE IMPROVED—A 0.002 in. platinum wire wrapped around a glass thread and inserted in a crushable, refractory lined, stainless tube responds to temperature changes with an accuracy of plus or minus 0.18° F, claims Engelhard Industries Inc., Newark, N. J. It's designed to work at temperatures less than 600° F in pressures of 2500 psi. Major application: Nuclear reactors where split second responses to temperature changes are critical. •

FUEL CELL GAIN—A Navy fuel cell being developed will employ a sodium amalgam-oxygen combination to produce about 100 hp. It will be 15 times lighter than standard battery counterparts. Efficiency is expected to be 60 per cent, says M. W. Kellogg Co., a subsidiary of Pullman Inc., Philadelphia.

PROGRAMED ROBOT LOADER duplicates human motions when handling production parts, states Consolidated Controls Corp., Bethel, Conn. Engineer Maurice J. Dunne demonstrates simplicity of programing: Pushbuttons inch robot through desired motions; "record" button makes it permanent by storing impulses on a magnetic drum.

Structural Adhesives Readied for Big Push

The biggest user, the aircraft industry, has led the way in showing the



WATERTIGHT, METAL SHIPPING CONTAINERS are made with a one part adhesive with an epoxy resin base, effecting a 25 per cent saving in design and production costs. Skilled operators are not required

structural possibilities of adhesives in metalworking

APPLICATIONS for structural adhesives are growing rapidly in assembly of small parts, panels, and honeycomb materials, and in the bonding of dissimilar metals. Manufacturers are helping to boost the potential for such adhesives by broadening properties and by making studies expected to lead to the design of better application equipment.

Probably the largest single user of high strength adhesives is the aircraft industry. Typical example: More than 80 per cent of the aerodynamic surface of one supersonic craft is adhesive bonded honeycomb sandwich. Companies outside the aircraft industry are also taking advantage of the experience obtained from plane construction.

• Adhesive bonding of watertight, metal shipping containers has reduced design and production costs about 25 per cent.

The container maker (Zero Mfg. Co., Burbank, Calif.) uses a one part, high strength adhesive with an epoxy resin base. The adhesive has void filling properties that make close tolerance machining unnecessary. Also, the containers are easy to square in production, because the adhesive remains malleable until it is cured. Major advantage: The containers are sealed at assembly and do not require further waterproofing. When disassembly is necessary, the container is placed in an oven and heated above the curing temperature.

• A pump manufacturer reports that adhesive bonding of parts simplified a difficult casting problem and reduced rejection rates to nearly zero from a previous high of 25 per cent.

The company simplified hard to make, complex castings by reducing them to several cast sections. The 25 per cent rejection rate on a run of 1000 castings amounted to more than $750. Other advantages: No skilled labor is required, machining has been reduced, and a switch in casting material lowered costs. The company estimates 1 gallon of adhesive is sufficient for assembly of 1000 castings at a cost of about 3.2 cents per part.

• A modified epoxy permits bonding of small pinion gears to rotor-shafts at a saving of $56.37 per hundred.

The parts go into timing gear assemblies made by Haydon Div., General Time Corp., Torrington, Conn. The company says the savings were made possible by reduction in rejects, elimination of secondary operations no longer necessary under adhesive bonding, and termination of 100 per cent inspection for shaft distortion. The company reports no failures during testing at high and low temperatures and under high humidity.

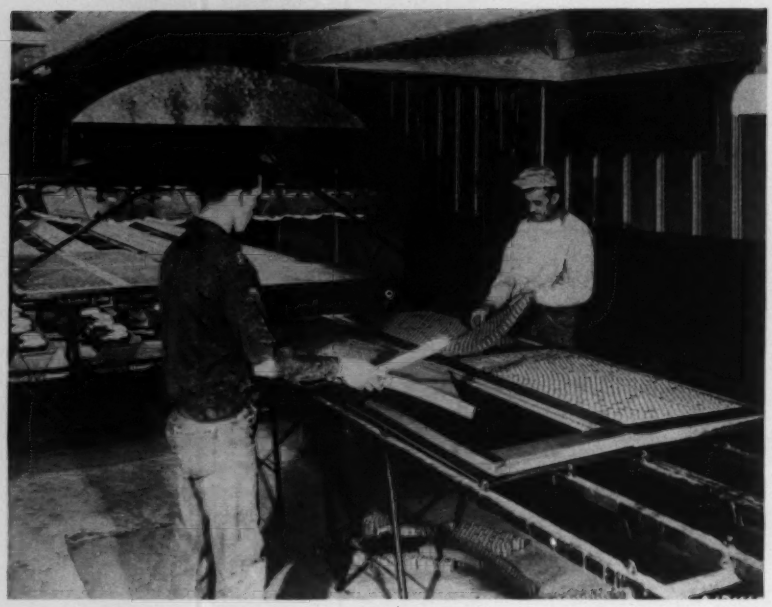
• Adhesive bonding of lightweight sandwich panels has paid dividends of lower production costs, stronger construction, and superior performance for a locomotive maker.

The company sandwiches a corrugated steel core between light gage sheet steel to form the side panels on diesel locomotives. The lamination is made in a single operation by joining the core to the sheet with a high strength structural adhesive.

• Bonding a powdered iron disc to

BONDING OF TIMING GEAR ASSEMBLIES saves $56.37 per thousand

BONDING SIMPLE CASTINGS INSTEAD OF MAKING A COMPLEX PART slashed a 25 per cent rejection rate to almost zero



ADHESIVE BONDING OF SANDWICH PANELS will be affected by research aimed at broadening adhesive properties and improving application methods

a diecast aluminum plate by adhesives produced several advantages for a firm making pneumatic tool motors.

The technique permits the proper balance of wear resistant and lightweight metals, reduces the weight of the finished product, and cuts machining costs. The company uses a film adhesive to provide uniform adhesive thickness throughout the joint, to confine the adhesive to the immediate bonding area, and to produce clean bonding with no solvent, waste, drying, or shrinkage problems.

• A die cut film adhesive has pared production costs more than 50 per cent per assembly in making manifolds.

In addition, adhesive assembly techniques solved a difficult manufacturing problem for Taylor Instrument Companies, Rochester, N. Y., produced a superior and better appearing manifold assembly, permitted use of lower cost materials, eliminated field failures and rework of rejected assemblies due to leaking, reduced rejection rates to practically zero, and cut leak testing operations from 100 to 10 per cent.

The part is a two piece, pneumatically controlled manifold that is used with other components to control a wide range of process variables, such as pressure and liquid level.

• Adhesive makers are trying to make their products more versatile and their application simpler.

They're looking for higher strengths at higher temperatures, good performance and high strengths on dirty and oily surfaces, simpler application techniques, and adhesives that cure in only a few seconds, says Adhesives, Coatings & Sealers Div., Minnesota Mining & Mfg. Co., St. Paul.

• Inorganic ceramic materials are being tried where the adhesive must resist high temperatures.

Included are sodium silicates, aluminum phosphates, porcelain enamels, solder glasses, oxychlorides, oxysulfides, cermets, cements, and mixtures. At temperatures up through 1000° F, shear strengths are reported to be in excess of 2000 psi for some of the ceramic materials. Primary aircraft applications are sandwich structures (honeycomb) and other metal bonding.

• Lack of suitable application equipment is delaying use of adhesive in many areas.

A lag in application equipment is one of the reasons why adhesives have not penetrated farther into the automotive industry, says Henry L. Dixon, general manager of Adhesives Div., B. F. Goodrich Co., Akron. Adhesives for jobs such as holding fenders on cars have been developed but application costs are too high, he says.

The Adhesives Dept. of Raybestos-Manhattan Inc. reports a need for a low cost proportioning and blending device for two component epoxies. Such a device would permit relatively small adhesive consumers to more effectively exploit two component systems without frequent weighing, mixing, and short pot life, it says.

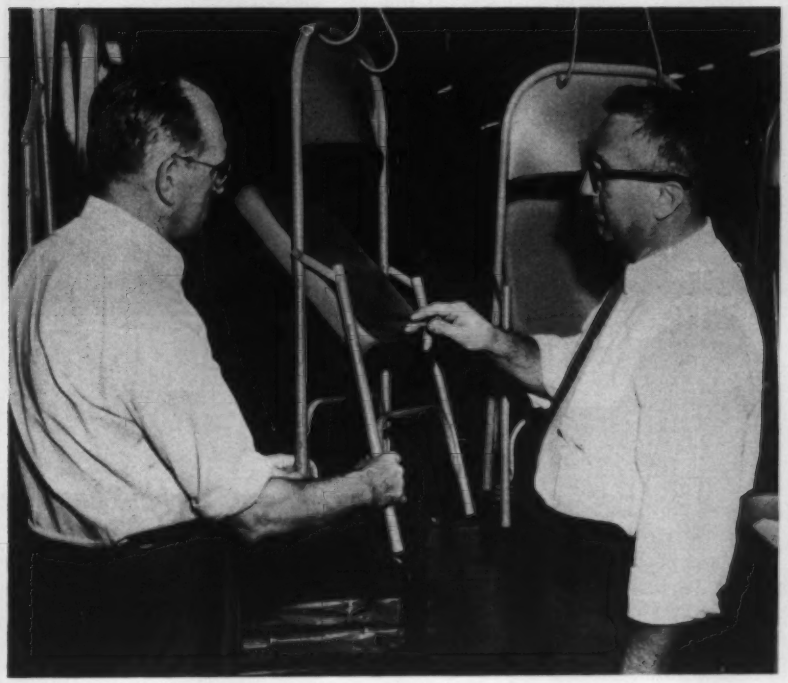
• Many applications are under test.

One company says adhesives will be employed in automobile engine parts, chrome trim fastening, radiator reservoir assembly, gasoline tank assembly, and for structural stiffening of sheet metal panels. It sees adhesive properties appreciably affecting automobile construction and design. Experimental work is being done on engine block buildup by laminating metal with adhesives, says W. E. Kelly, manager, Adhesives Dept., Goodyear Tire & Rubber Co. Inc., Akron. An adhesive maker suggests that car manufacturers would do well to borrow design techniques from planemakers.

Plumbing is another target. It is pointed out that adhesives with capillary action could be used in place of solder for copper joints and might even prepare the way for aluminum plumbing. Adhesives are also seen as a possible substitute for conventional threading of steel pipes.

Armstrong Cork Co. tells of building panel applications where adhesives bond an insulating core (asbestos cement) in a sandwich.

And a report from another source indicates that a long period of research in bonding tin can tops, bottoms, and side seams may soon pay off.



New Paint System Cuts Costs By Third

IMPROVEMENTS in application have increased paint coverage per gallon five times at Hampden Specialty Products Co., Easthampton, Mass. The company makes such products as folding tables and chairs, juvenile tables and chairs, and outdoor casual furniture.

Other benefits of the system (electrostatic spray painting) cited: The company says it is saving $100 per week per paint booth in cleanup costs; it has eliminated hand touchup; and manpower is used more effectively than it was.

• Chairs were formerly sprayed with hand guns.

"We were getting 18 to 20 chairs per gallon of paint by hand air spray, and the finishing department was a constant bottleneck in production," says Sam D. Lockshin, vice president in charge of manufacturing. While the hand spray painting was an improvement over the hand or automated dipping methods used when chairs were first produced, it required four booths and three hand sprayers per booth on each 8 hour shift.

First step in improving the hand spraying was conversion to electrostatic spraying, using two reciprocating disc units, made by Ransburg Electrocoating Corp., Indianapolis. Hand guns were still used—but only for touchup work. Paint coverage was boosted to 50 chairs per gallon.

• To eliminate the hand touchup, two Ransburg No. 2 process bell atomizers have been added to the line. They are used with five auxiliary air guns.

The air guns are triggered automatically to coat shielded and recessed areas. The changes increased production to 100 chairs per gallon of paint.

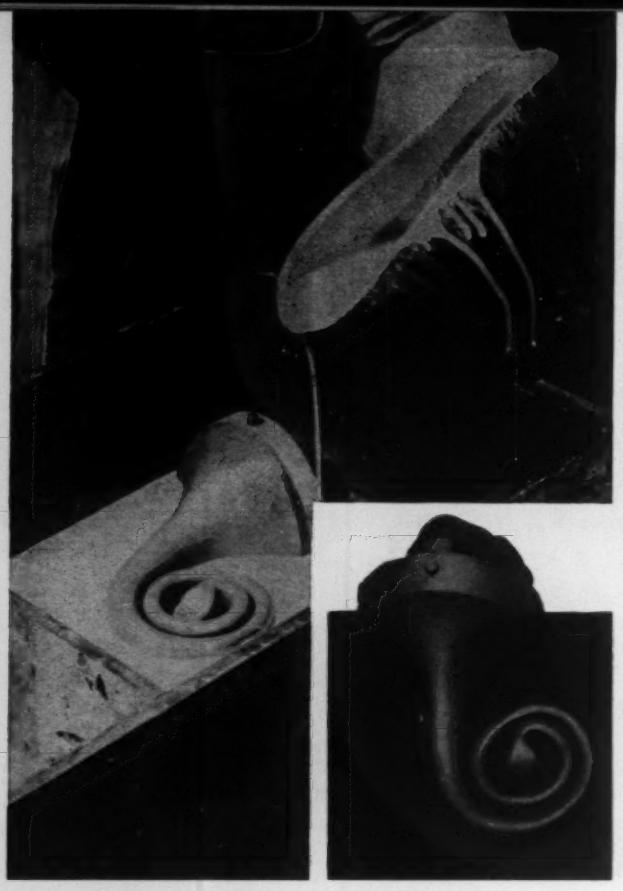
Prior to painting, the chairs are cleaned with a phosphatized cleaner, rinsed in water, given a chromic rinse, and dried in a gas oven. After a 7 minute cooling cycle, the chairs are opened about half way for better paint deposition. The conveyor makes an S-shaped loop around the two, ceiling mounted reciprocating discs, so that both sides of the chairs are coated.

The chairs are manually folded after leaving the disc stations, and the conveyor takes them to the first of the bell atomizers, which coats the front of the chair. Then three electrostatic air guns are triggered to spot hard-to-reach areas. After indexing, a similar operation with a bell atomizer and two air guns coats the other side. The final loop of the conveyor bakes the paint in an oven at 325 to 350° F for 8 minutes.

• Over-all saving in finishing costs is 33 per cent, the company says.

The changes permit increasing the conveyor speed to 22 ft per minute vs. 13 with the previous methods. Production is now more than 5500 chairs per shift on each of the two lines (vs. 3200 per day per line formerly).

Booth cleanup, while not eliminated, has been reduced. With less overspray, maintenance costs are down. Cleaning up on weekends, necessitating overtime pay, formerly cost $130 per booth per week; Hampden says the present cost is only $30 per booth.



Ster Foundry Div., Pierce Industries Inc.

Lebanon Steel Foundry.

Die for auto horn, turbine housing,

Cracks in Mold

DELIBERATELY induced microcracks in a ceramic mold are aiding in the production of precision castings. They permit pouring the molten metal into a cold mold, eliminating preheating; they also reduce risering requirements, yet do not permit metal penetration into the mold wall, so that good surfaces can be obtained.

The process involves igniting the mold after it is stripped from the pattern. As the volatile ingredients are consumed, a three dimensional pattern of fine cracks is produced in the ceramic. The cracks are the main key to the successful application of the process. (The British development is offered by the Shaw Process Development Corp., Port Washington, N. Y., a division of British Industries Corp.)

• Watertown Arsenal, Watertown, Mass., is using the process for components of the M-85 machine gun.

Close tolerances, required on such parts as barrel supports and flash suppressors, are obtained by the use of the microcracked molds. The elimination of rough machining operations is expected to reduce the cost of producing the parts.

G. D. Chandley, chief metallurgist at Watertown Arsenal, says that the breech ring for the 105 mm tank rifle, a 900 lb piece, is also being patterned for the Shaw process. It is designed for 150,000 psi yield strength and must pass impact tests at subzero temperatures. Estimated saving via the elimination of rough machining: $125 to $200 per ring.

The gun barrel support, which is 18 in. long and has a cast weight of about 15 lb, is the first step in a program aimed at reducing production time and costs at Watertown. Rough machining will be eliminated; original production had been from a solid piece of alloy steel. A change in alloy composition is also contemplated.

• The method has been used to cast tools and dies.

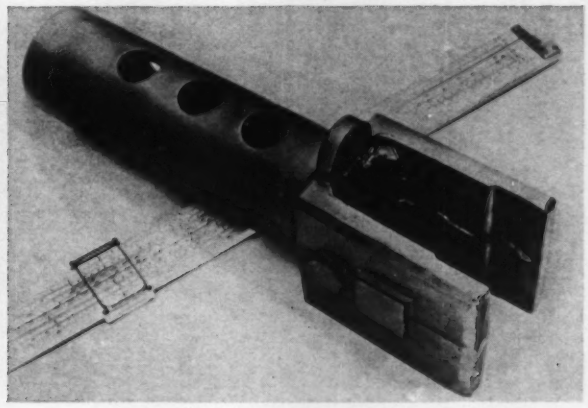
Forging die inserts have been cast by the Shaw process. They were used to produce steel wheel guides for one of the compact cars. Cast in hot work die steel, the inserts were used in the as-cast condition.

Drop forging, press forging, and swaging machine dies are being cast, says Shaw. Most of them involve chromium-tungsten hot work alloys. Worn dies can be remelted and used in the casting of new ones, and the convenience of casting replacement dies means that there is little time lost due to die failure.

Reduction of machining in die manufacture is another advantage. Finish is good as cast, so there is little cleaning up to be done before placing a cast die in service. Many of the conventional hot work die materials (including D-5, H-11, H-13, and H-21) have been used, and the cost of machining these materials has been cut.

• Diecasting dies have also been

Detroit Gray Iron & Steel Foundries Inc.



Watertown Arsenal.

forging die, gun barrel support bolster claim that . . .

Make Better Castings

produced as castings.

Promoters of the process claim improved die life and better casting finish. Two factors are primarily responsible: Eliminating small inserts cuts down on blistering and excessive flash, while the absence of tool marks cuts dragging and avoids excessive use of lubricants or release agents. And casting offers a relatively low cost way of obtaining multiple cavity molds, as well as reducing the cost of replacements when they are made necessary by heat checking or wear.

When casting cuts the cost of tooling, shorter runs become economically sound. So parts not previously considered become practical for diecasting.

The process can be applied to large dies — though this is not a common practice. Licensees report use of larger castings. A major manufacturer of automobiles in Japan has produced stamping and forming dies weighing up to 3½ tons, in addition to using the process for diecasting dies, permanent mold patterns, and metal patterns for shell molds.

• Another area of application is in aircraft and missiles.

The many changes and short production runs characteristic in the manufacture of aircraft and missiles make precision casting a valuable method. The Shaw process has been used for a number of such castings. Lebanon Steel Foundry, Lebanon, Pa., has employed the process to cast a turbine housing for the Atlas, Jupiter, and Thor missiles.

• The process involves special materials and methods.

The ceramic material used to make the molds is composed of several refractory powders, a liquid medium based on ethyl silicate, plus a small amount of a gelling agent. They are combined to form a slurry, which is poured over the pattern and allowed to gel.

After the gel is formed, the refractory mass is stripped from the pattern. It is then ignited and allowed to burn until all volatiles are consumed.

The burning step, characteristic of the process, causes formation of a multitude of tiny cracks throughout the ceramic—this is called microcrazing. The cracks, dispersed through the body of the ceramic, are controlled in size; they are small enough to prevent molten metal from entering because of its surface tension, but they allow air and gases to escape so that many casting defects are avoided. The microcracks serve another purpose —they permit expansion of the individual particles of refractory when the molten metal is cast against them, avoiding damage to the mold.

The microcracked molds mean some changes in pattern design are possible. Since gases can escape through the walls of the mold, there is less need for risering to bleed them off. This simplifies pattern design and reduces the trimming steps after casting.

'The Time Is Ripe For Tapping Foreign Industrial Markets'

So says machine tool builder Francis J. Trecker

U. S. PRODUCERS of industrial goods have a temporary advantage in the world market they can't afford to ignore, feels Francis J. Trecker, president, Kearney & Trecker Corp., Milwaukee.

Just back from a trip around the world, Mr. Trecker tells STEEL that the foreign markets for industrial goods, particularly for capital equipment, should be strong for several more years.

"Our chief advantage now is delivery. We can ship machines from our Milwaukee plant six weeks to three months after we get the order. Contrast that with about eight to ten months for Italian equipment; 12 to 14 months for German, English, and French equipment; and 20 months for Japanese equipment.

"Despite our price disadvantage, we can compete abroad simply because the managers in expanding industries don't want to wait a year or more for their new equipment. About six weeks ago, an English buyer bought a $250,000 special machine from our U. S. plant, even though the machine is one we normally would build in our English plant."

• Foreign producers of electrical and consumer products are increasing their capital spending.

Mr. Trecker feels that those two segments of foreign industry may well take up the slack left as foreign automakers complete their expansion programs.

"Prosperity abroad has boosted the standard of living in most countries. Citizens who used to be workers with a relatively meager existence have suddenly found themselves with the money to become consumers. As a result, makers of consumer products have an accelerating demand for their products in their home countries, and they are expanding capacity to take care of that demand.

"This is particularly true in England, Italy, and Germany, and most of the other countries are following suit."

As an example of what's going on in electrical product plants abroad, Mr. Trecker cites a stopover in Japan. He sold 17 machines to one company.

• The stepped up marketing pace abroad ought to pay off rapidly.

Kearney & Trecker has seven plants in England that produce standard and special machine tools (including engine lathes and automatic screw machines), small tools, chucks, and automotive dies. So far, the company has not moved onto the continent, principally because Mr. Trecker is convinced the Common Market and the Outer Seven countries will have trade agreements. His English facilities will serve both markets. He has also studied the possibility of building machines in the Orient.

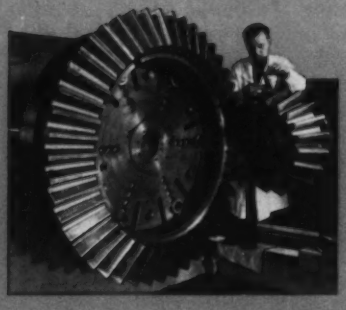
On the continent, he sells through dealers—seven direct K&T men work with the dealers. He plans to add to his direct sales staff abroad. Mr. Trecker wants at least one direct representative in each of the countries.

"There's no doubt that many of us can use booms abroad to help offset the slump in our domestic markets. But we don't have much time to waste. When our foreign competitors catch up with their orders and can match us for delivery, they'll be right back at us with their tremendous price advantage. Then, we'll have to count on our foreign manufacturing facilities to allow us to compete."

UNCHALLENGED IN QUALITY

ILLINOIS GEARS

Testing Herringbone Gear With Integral Shaft Pinion



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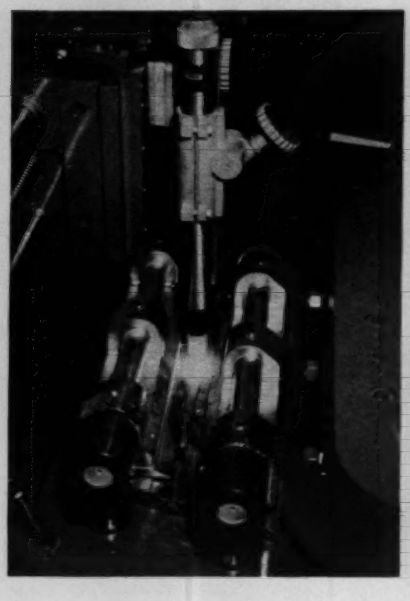

Coil ends are angle cut and joined on this automatic machine . . .

Skelp Welder Speeds Tubemaking

USERS of strip steel can now eliminate stops for coil changes and run their lines continuously. The advance is made possible by improved end welding and strip storage equipment.

An automatic line, said to be smaller and less expensive than similar units built to handle the same widths and gages, has been developed by two Cleveland firms, Guild Metal Joining Equipment Co. and Mechanical Equipment Co. The line will be in operation soon at the Electricweld Tube Div., Oil City, Pa., of Jones & Laughlin Steel Corp.

• **Angle cutting of coil ends and alignment of edges are said to make for smoother roll forming.**

The line handles skelp up to 3/16 in. thick and 15 in. wide, moving as fast as 150 ft a minute. The double ended uncoiler can take coils up to 54 in. in diameter.

As the trailing end of the strip leaves the uncoiler and starts through the pinch roll and flattener, an ultrasonic end detector starts a timing device. After a preset interval (determined by strip speed), a clamp closes on the strip in the overhead loop. That stops the end of the strip in the shearing-welding unit; it also actuates a motor powered winch that controls the loop carriage. The carriage moves forward during the shearing and welding operation, releasing up to 360 ft of stored steel strip.

Another clamp in the welding unit holds the trailing end of the strip while it is sheared at a 15 degree angle. Side guides keep the strip edges aligned while the ends are sheared.

The leading end of the new coil passes through the flattener and into the welder, where it is also sheared.

The two coil ends are then butted together for welding.

• **High speed arcwelding builds the heavy gage coils into a continuous strand.**

A proximity switch and delay network start and stop the welding process as the head passes over the edge of the strip. Tungsten arc welding (with an argon shield) joins the two coil ends at a rate of 30 in. per minute (for most gages).

A flat seam is formed on the skelp, so no flash trimming is necessary before roll forming.

When the weld is completed—in about 45 seconds—clamps on the overhead loop and on the welder are released, permitting strip to move toward the processing line. The powered winch returns to its normal position, building up moving storage in the loop.

The horizontal loop, said to be possible because of the speed of the welding process, saves floor space. All controls for the looping mechanism are connected to the end detector and end welder circuits.

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extruding stainless steel is a new technique . . .

The successful extrusion of Stainless Steel, Carbon and Alloy Steels, and Super Alloys by Harper opens new horizons that are limited only by the imagination. With an endless variety of configurations possible, industrial designers and metallurgical engineers can now take advantage of low initial die costs, material savings and reduced costs of secondary machining. Experimental runs or long runs —square cut sections or straight and true lengths up to 60 feet—are available . . . backed by thorough metallurgical control from billet casting to finished shapes.

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Language booths like these are . . .

New Use for Perforated Metal

ACOUSTICAL PANELS made of perforated metal and glass fibers are being used in language booths by the Wichita, Kans., school system.

The panels are made up in three-layer sandwiches. The outer layers are 22 gage perforated sheets, bent 90 degrees at the edge to form stiffening ribs. (The metal is made by National-Standard Co. at its Cross Perforated Metals Plant, Carbondale, Pa.)

Two, ¾ in. glass fiber batts are placed inside each sheet. A center barrier of polyethylene film separates the batts to eliminate cross-talk between booths.

A steel channel is wrapped around the sides of the panels and spot-welded to the perforated metal. The panels are spray painted hammertone gray.

The panels make up three sides of the language booths. The side faced by the student is a convertible locking desk top that can be raised. The front panel is backed with Formica and can be dropped to form a working surface, giving maximum forward visibility for group work.

• Perforated metal was chosen for eight reasons.

1. MacLean W. Briggs, chief design engineer at Advance Furnace Co., Wichita, where the panels are fabricated, says that perforated metal promises to stand rough usage.

2. Perforated metal offers up to ten times greater open space than other available materials, increasing the sound absorbing ability of the panels. Pressed fiberboard with 3/16 in. holes on 1 in. squared centers offers 2½ per cent open space. Board with 3/16 in. holes on ½ in. squared centers offers 10 per cent open space. Perforated metal with 3/32 in. holes on 5/32 in. staggered centers offers 33 per cent open space.

3. Spotwelds are used to fasten the panels together. They are durable and economical, says Advance Furnace. No inventory need be stored for clamping and curing.

4. The formability of perforated metal permits right angle bends to form stiffening members integral with panel surfaces, eliminating costly forming and fastening of separate spars and reinforcing members.

5. You can bend and shear perforated metal much faster than you can alternative materials, claims Mr. Briggs. Simple shears and press brakes with standard dies do the job without delays.

6. The inherent strength of steel permits the use of sheet stock only 0.040 in. thick, so panel thickness is almost entirely basic sound absorbing material.

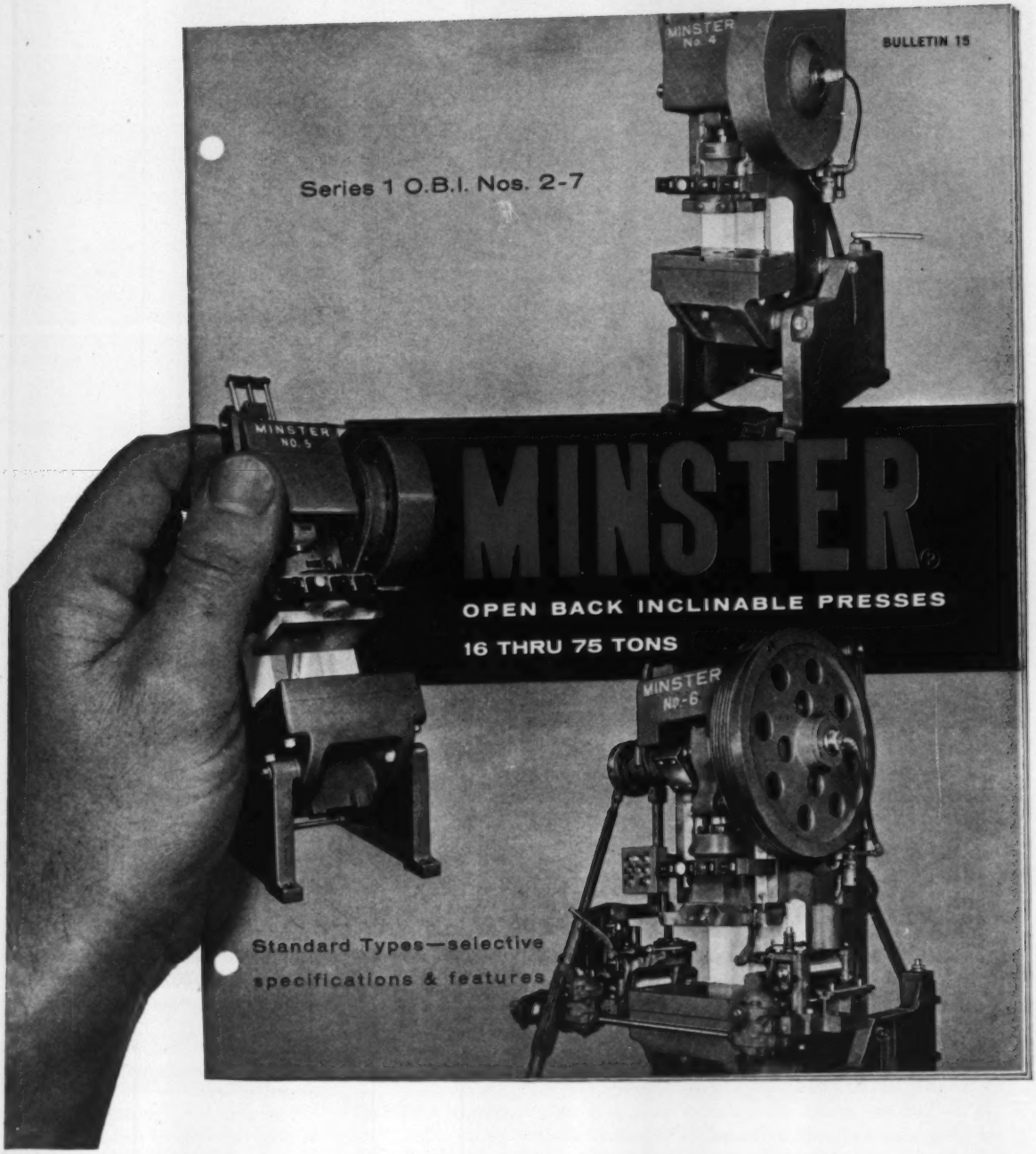
7. Manufacturing economies possible with perforated metal cut the final cost below that of alternative materials even though the sheets are more expensive initially. Because the booths are lighter with metal construction, freight and delivered costs are reduced.

8. The booths won't burn.

Machine Tool Maker Cites Case for Numerical Control

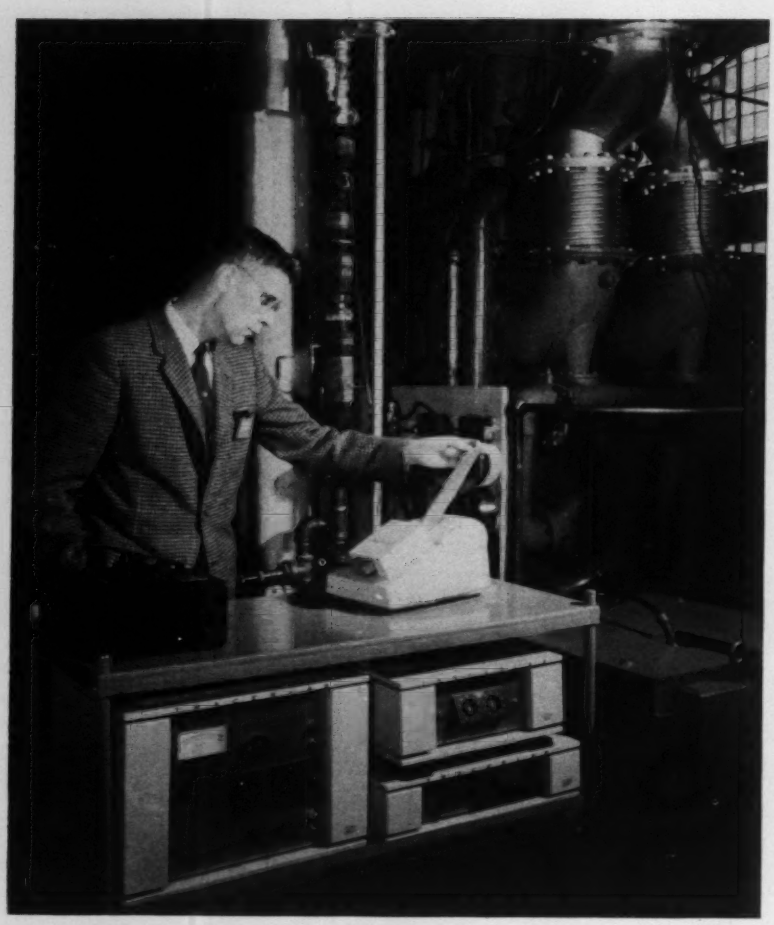
"In spite of ten years of effort, machine tool users still don't understand the implications of numerical control," says Frank Fields, president of Fosdick Machine Tool Co., Cincinnati. "Only a few manufacturers are taking advantage of the huge savings available. . . ."

He adds that hardware and techniques have been overemphasized to the exclusion of advantages. "First you've got to make people understand that numerical control lifts metalworking to a new level of profitability . . . and every numerical control system can do this."



The "Hidden Strengths and Values" of Minster O.B.I. presses . . . points of superiority that only Minster offers the O.B.I. user . . . are outlined in this new Bulletin 15. It will help you make comparisons when next you buy an O.B.I. May we send you a copy? Write or call . . .

The Minster Machine Company, Minster, Ohio



With running check of radioactive debris . . .

Dieselmaker Improves Technique for Wear Study

A NEW TWIST in the technique of studying wear with radioactivated metals has opened new vistas for research people, say W. C. Arnold and V. T. Stonehocker, Diesel Engine Experimental Dept., Beloit, Wis., Fairbanks, Morse & Co.

Radioactive wear studies aren't exactly new, but the method of irradiating selected areas of big diesel engine cylinders is. It enables investigators to quickly determine the effects of various lubricants, fuels, and other operating conditions in a diesel engine.

The big meaning, as Mr. Arnold sees it:

1. Researchers can run down the effects of wear variables in two weeks instead of two years. (Also, engines don't need to be disassembled.)

2. Researchers can make measurements formerly thought impossible. For example, it has been found that the wear rate on new parts is astronomical during the first 10 or 15 minutes. Result: Long wear-in periods aren't needed. Fairbanks, Morse may soon cut its 50 hour engine run-in time to only 6 or 8 hours.

Other results turned up by Fairbanks, Morse:

- Sulfur in fuel increases wear. For example, if you use a fuel containing 2 per cent sulfur, you can cut wear on cylinder liners 70 per cent by obtaining a fuel with only 0.5 per cent sulfur.
- Temperature affects wear. There is an optimum, says Mr. Arnold. Temperatures that are too high or too low increase wear.
- Too much back pressure in an engine exhaust system increases wear.

• It is comparatively easy to irradiate small, uncomplicated engine parts like piston rings. Such wear data, however, can't be correlated with wear on cylinder liners which are more important because they're more expensive, points out Fairbanks, Morse.

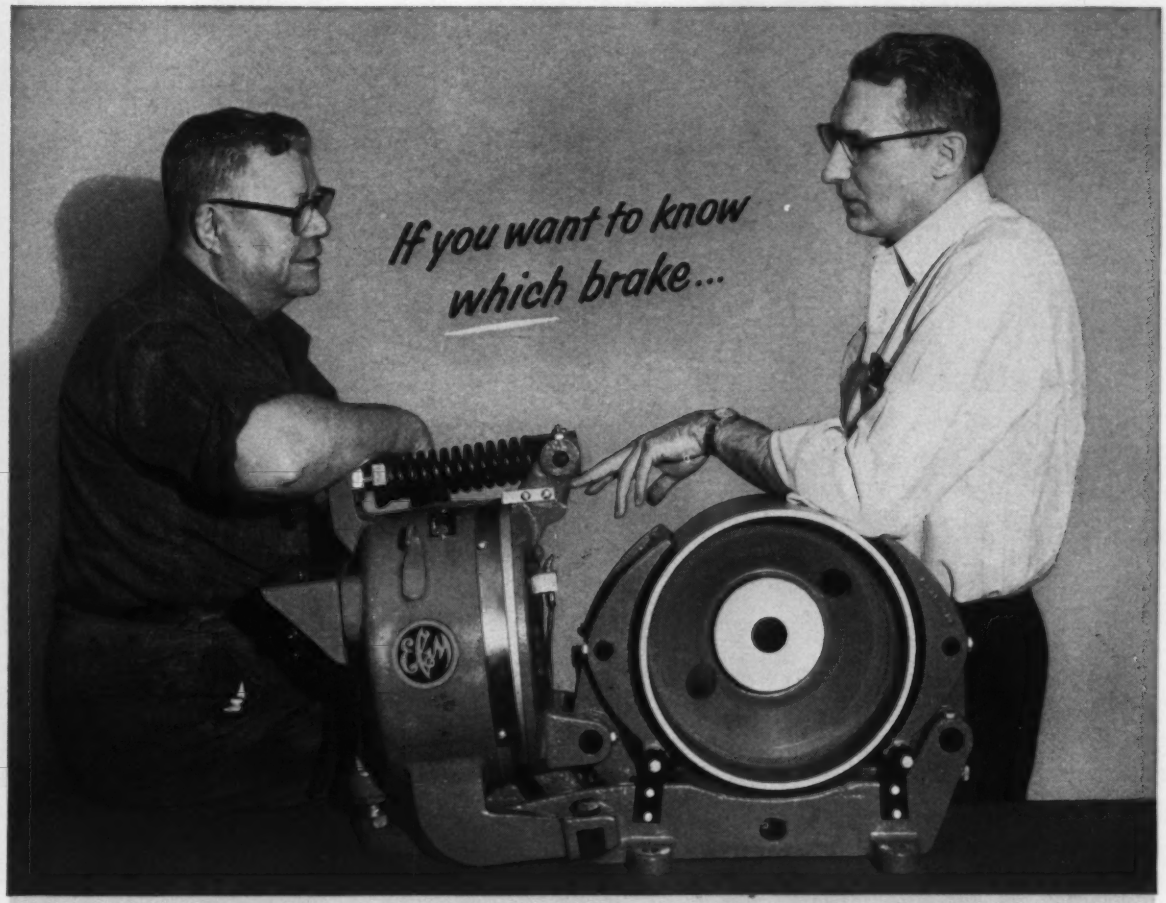
Wear studies required disassembly until Fairbanks, Morse (working with Battelle Memorial Institute, Columbus, Ohio) developed a technique for making a selected portion of a large part radioactive, says Mr. Arnold.

Here's how the parts were prepared and irradiated. A 160 lb cylinder liner 42 in. long was shielded externally with cadmium. A band 1½ in. wide in a selected area was left uncovered. The liner was then placed in a watertight aluminum capsule. After pressurizing with helium, the assembly was irradiated in the Battelle reactor for four weeks.

• Radioassay techniques measure cylinder wear qualitatively and quantitatively.

The analysis procedures currently involve recovery of radioactive wear products from lubricating oil and exhaust gas streams. Samples of wear products are taken at 6 and 16 hour intervals.

Fairbanks, Morse intends to extend its investigations of the effects of operating conditions on large machinery parts. It has obtained a license from the Atomic Energy Commission to handle radioactive products.



Ask the Maintenance Men!

There are certain standards of performance maintenance men expect of any brake used on crane or mill applications. EC&M's WB Brakes, they'll tell you, have surpassed those standards for years—with plenty to spare.

It's when you ask about installation and maintenance that you'll find why so many of these men prefer Type WB Brakes.

Without getting into a lot of detail, here are a few features of WB Brakes which the maintenance men rate very high—

Manual release for free rotation—a real convenience when you're setting up a new installation. Or want to lower a load on power failure. Or when you're replacing a shoe or lining. ***Single adjustment for lining wear***—so simple yet so positive. ***Connecting lever below brake wheel***—really speeds up armature replacement. ***Recessed armature*** lets dust and magnetic particles fall free—no periodic "digging out". ***No freeze or bind***—if lubrication is ever needed to free any part, WB Brakes have alemite fittings at all points.

***SIX SIZES** of WB Brakes cover the complete range of 600-series motors*
Write for the New Bulletin 5000—it tells all

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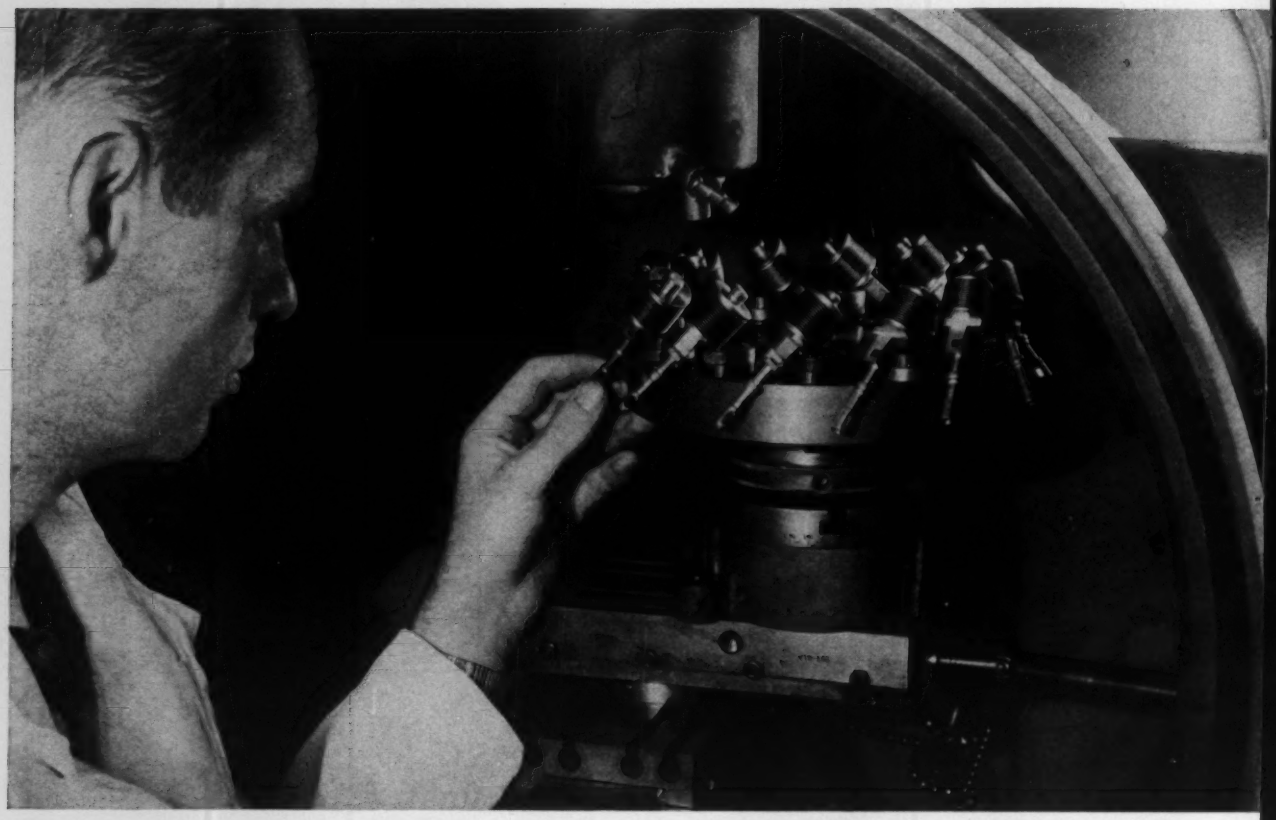


Joining of stainless missile, jet parts illustrates how . . .

Electron Beam Welds

THE PRECISE HEAT of an invisible electron beam has greatly speeded and improved the joining of parts in extremely delicate pressure sensing devices at Metal Bellows Corp., Wellesley, Mass.

The firm makes instrument type bellows for jet engines, missile gyroscopes, and products for similar advanced equipment. It cites these examples to illustrate the benefits of electron beam welding:

1. A pressure sensing element for a J-57 Pratt & Whitney engine was formerly sealed with a soldered mechanical joint. Electron beam welding boosted production 650 per cent, cut costs 5 per cent, and improved quality.

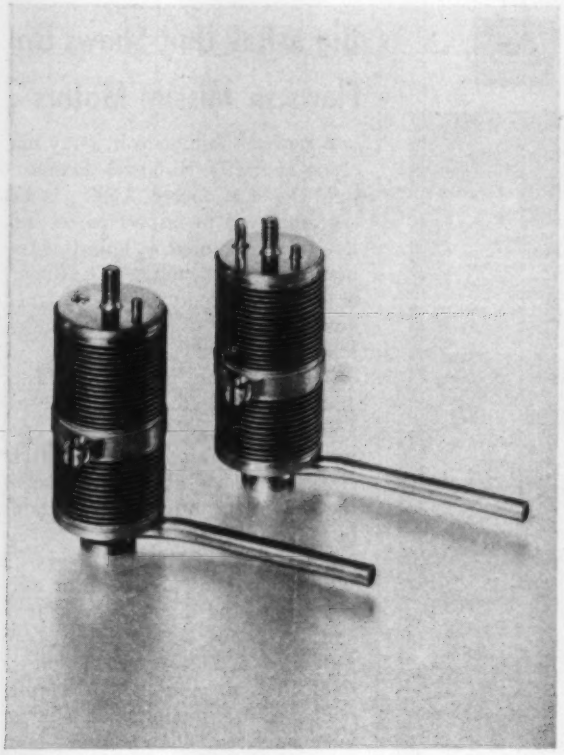
2. A fluid volume compensator for an inertial guidance gyroscope was formerly soldered to its base. Electron beam welding cut production time 80 per cent. Finished pieces are no longer distorted; joint quality is uniform.

3. An adjustment stud on an accelerometer bellows housing is electron beam spotwelded instead of soldered. Surface preparation is no longer required. Cracking has disappeared. Since parts are no longer discolored, their acceptance has increased.

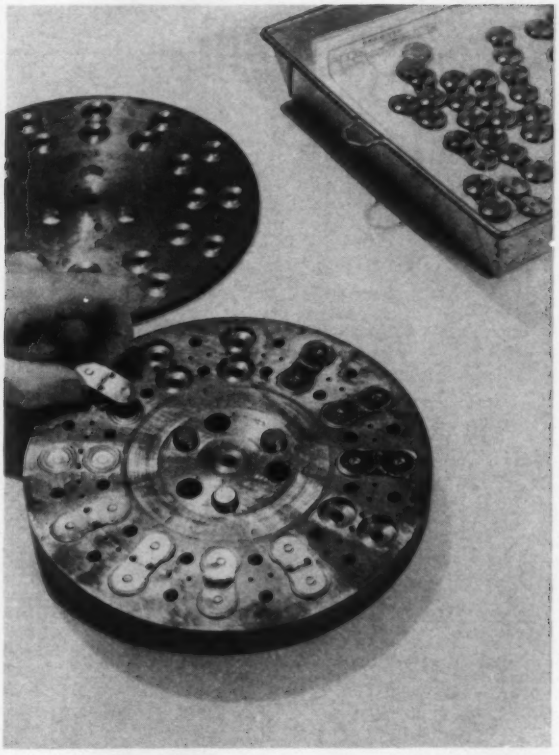
In addition to those advantages, the firm claims its savings will pay for the welding machine within a year.

• The stainless steel bellows automatically adjust fuel flow in a jet engine. Evacuating the bellows had been a problem.

The top of the old bellows (illustrated) had a lead screw, a locating pin, and a tube for evacuating the bellows. To assure a vacuum tight seal, it was necessary to machine both tube and hole. The tube was then brazed in the hole. Following welding of bellows and



JET ENGINE FUEL BELLOWS sense pressure for control system. Old brazed style is on right



INERTIAL GUIDANCE GYROS rely on bellows to offset pressure changes. They're spotwelded to Inconel bases

Pay Off for Bellowsmaker

base plate, the assembly was evacuated, the tube pinched off and soldered. Despite precautions, many assemblies leaked, necessitating extensive repairs. Maximum production was eight an hour.

With electron beam welding, only the hole is machined. No tube is needed. Up to 20 bellows are mounted on a fixture in the NRC welder (it's made by NRC Equipment Corp., Newton, Mass.). Bellows are evacuated automatically when the welding chamber reaches the operating condition. Both sides of the machined hole are melted and fused. Welds are free of porosity, so leakers are rare, says Metal Bellows. Maximum production is now 60 an hour.

• Several other applications reaped benefits for the firm.

The twin bellows for the inertial guidance unit is made of 0.003 in. Inconel welded to a 0.006 in. base of the same metal. Electron beam spotwelding is superior to the old soldering method, says Metal Bellows. The earlier joining method not only distorted and occasionally cracked the bellows, the discoloration often raised doubts about product quality.

The electron beam welder also serves as a heat source for brazing nickel parts and for Nicrobrazing or copper brazing miscellaneous stainless steel parts. No flux is needed since low operating pressure removes surface contaminants and prevents oxide formation. It also keeps high heat within narrow limits to hold down vaporization.

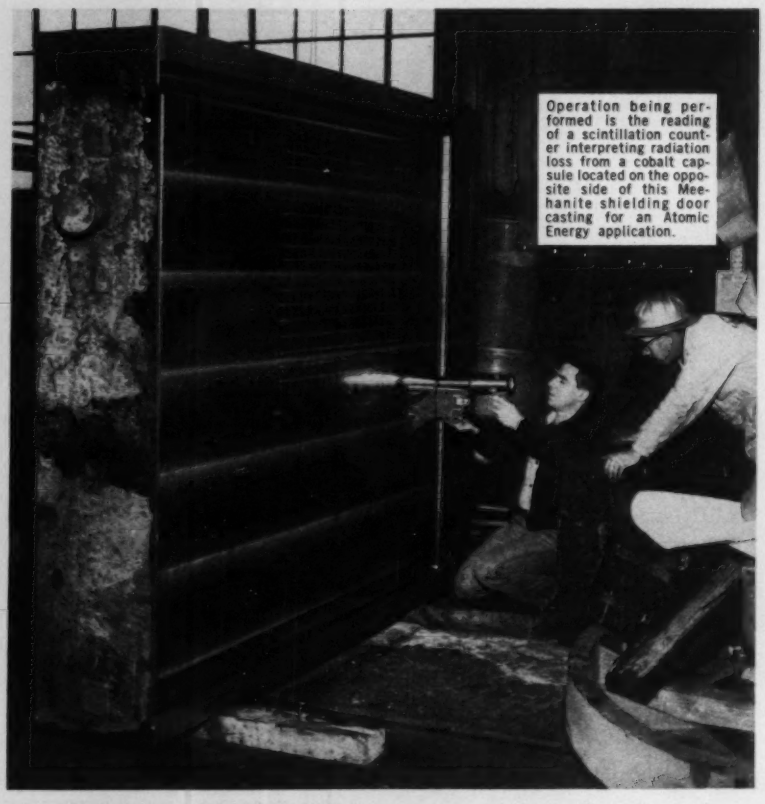
The company points out one disadvantage: The brazing operation is slow, so it is presently confined to small batch production of 100 pieces or less. For regular production, the firm prefers to braze in a regular furnace with inert atmosphere.

• Experts say fixturing is important to successful operation.

The company believes that proper fixturing is a key to success and that it is best provided by a user both from the standpoint of design and investment. The firm employs a number of precision fixtures that are comparatively easy to make.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

MEEHANITE® MEANS BETTER CASTINGS


Operation being performed is the reading of a scintillation counter interpreting radiation loss from a cobalt capsule located on the opposite side of this Meehanite shielding door casting for an Atomic Energy application.

Specify Meehanite® For High Density And Solidity In Heavy Sections

Dimensions of the 85,000 lb. Meehanite casting above are 12'6" x 12'6" x 12" thick. Specific gravity tests, ultrasonic and radiation loss readings verify its uniform and controlled density.

In massive castings of this type which have a slow cooling rate, there is a natural tendency towards a more open structure with a corresponding loss in strength. However, in Meehanite castings the effect of "mass influence" is minimized through the use of constitutional carbide controls which are exclusive to the Meehanite Process. Breakdown of structure due to slow cooling is avoided by providing a definite degree of undercooling of the graphite to the melt.

In specifying the correct type of Meehanite metal for castings with very heavy or very light sections, the effect of mass influence should always be considered.

For detailed information, send for a free copy of bulletin TD-14-EFFECT OF MASS INFLUENCE. Write: Meehanite Metal Corp., New Rochelle, N.Y.

MEEHANITE METAL

Meehanite Castings Are Made Only By Meehanite Foundries

Big X-Ray Unit Shows Up Flaws in Missile Motors

A new, 10 million volt, x-ray machine at the U. S. Naval Ammunition Depot, Concord, Calif., is being employed to inspect rocket motors like those used in Polaris, Minuteman, and Skybolt. The "linac," or linear accelerator, was designed and built by Varian Associates, Palo Alto, Calif.

The machine makes for faster and more accurate radiographic examination of solid propellent motors. The motors must not contain cracks or voids that might upset the required controlled, predictable burning rate.

The unit includes a powerful "gun" that aims a barrage of electrons at a gold target, causing it to emit powerful x-rays which can penetrate a 5 ft thick section of solid fuel in minutes. A permanent record is produced on film for later analysis. Flaws a few hundredths of an inch in diameter can be detected.

The x-ray head can be rotated 360 degrees in a vertical plane. The "linac" is mounted on a turntable that rotates 360 degrees in a horizontal plane; it is suspended from a telescoping, overhead crane. Those features give the machine the flexibility it needs for examination of bulky, odd-shaped objects, impossible or extremely difficult to x-ray with other equipment.

Other models of the linear accelerator are said to have potential in other industrial radiographic test situations. Several energy and power levels are available. Steel fabricators might use such a machine for fast, accurate detection of internal material flaws.

Trends in Grinding

Five significant trends in grinding were reported at the recent Mid-Winter Conference of the Grinding Wheel Institute. They are: Higher operating speeds; closer tolerances and finishes on work; working of materials that can't be machined other ways; improvement in crush dressing methods; better grinding standards for use of wheels on automated production lines.

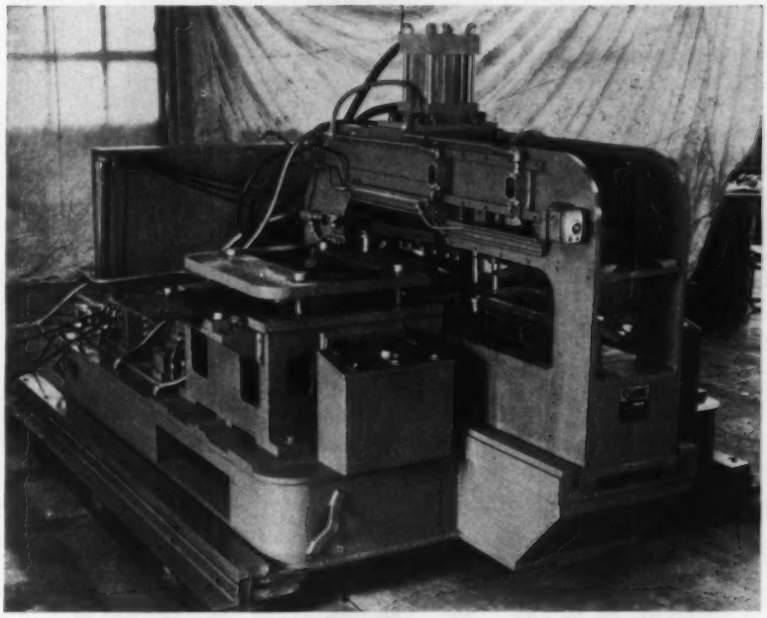
Shear-Welder Keeps Strip on the Go

INTERRUPTION of strip forming machines (tube mills, roll forming machines, and punch presses) can be eliminated. The Clark automatic shear-welder clamps, shears, butts together, and welds two ends of strip (nonferrous or ferrous—including stainless) while subsequent equipment is fed from a looper.

Clark says that weld quality permits the strip to run directly from the shear-welder through strip forming equipment. The unit can also be manually controlled (by pushbutton) through each step in the operating cycle. The die type shear cuts camber out before joining the two edges.

The unit can switch from Mig to Tig or back again in about 2 minutes.

For further information, *write* Clark Co., P. O. Box 316, Walbridge, Ohio.



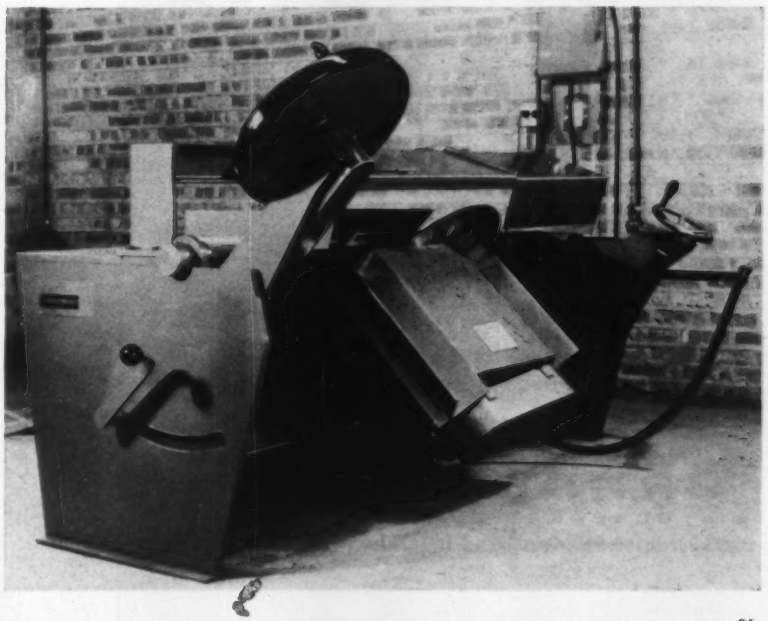
Saw Makes Straight, Beveled, Mitered Cuts

STRAIGHT, beveled, and mitered cutting on lightweight profiles, such as metal door frames and for heavy ship channel, tubing, plate, and beams, can be done on the Promacut 12A cutoff saw.

The unit can handle stock up to 5½ in. high and 31½ in. long. Without using a coolant, it can make a straight cut on a 12 in. x 35 lb ship channel in 12 seconds or a 45 degree bevel cut in 19 seconds. Other cutting times: 1½ seconds for a through cut on a 2 in. diameter x ¼ in. wall SA-106-B pipe and 4 seconds on a 5 x 5 x ½ in. angle.

Bevel cuts are made by setting the saw. Miters are made by flipping the fence. Both adjustments are made quickly and easily up to angles of 45 degrees.

The company says the Promacut-



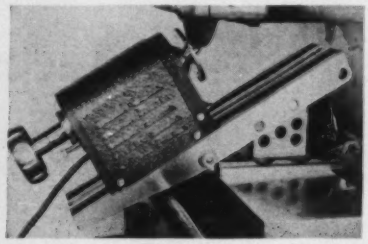
ting principle is dependent on a tooth shape which produces a semi-milling action, rather than biting and chipping. High blade rotation speeds and high torque of the 12 hp motor also help. The blade is said to move through the stock so fast that heat is not absorbed and the result is an almost burrfree cut without drag or coolant.

The unit is 57½ in. high, 47¼ in. wide, and 79 in. long (plus 4¼ in. feed wheel overhang). Shipping weight: 3069 lb.

For further information, *write* Production Machinery Inc., 4941 W. Belmont Ave., Chicago 41, Ill.

Attachments Increase Uses for Surface Grinders

A CYLINDRICAL grinding and indexing attachment makes possible a wide variety of grinding operations on surface grinders such as disc cutters, points on lathe centers, mill saws, flats on a 30 degree-3 square triangular punch and others. For grinding perfect tapers, the attachment has a two way, 5 in. sine bar,



tilt adjustment to duplicate angles. Gage blocks eliminate guesswork, says the company. Indexing is done at the handle end of the spindle.

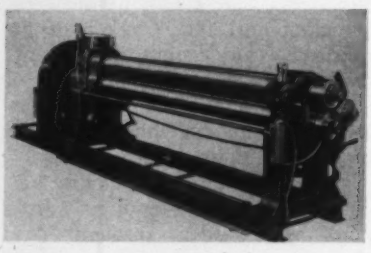
The attachment has three spindle speeds—200, 400, and 700 rpm. Capacity between centers is 7½ in. (length) and 6½ in. (diameter). Collet capacity is ⅝ in. with ½ in. hole through spindles.

For further information, *write* Therien Engineering & Machine Co., 4908 N. Odell Ave., Chicago 31, Ill.

Sheet, Angle Bending Roll Combined in One Unit

AN INITIAL type sheet bending roll that takes 20 gage to 7/16 in. material in widths up to 122 in., and an angle bending roll that will take angles from 1 x 1 x ¼ to 2½ x 2½ x ¼ in. have been combined.

The rolls of the initial type bending roll have extended journals with



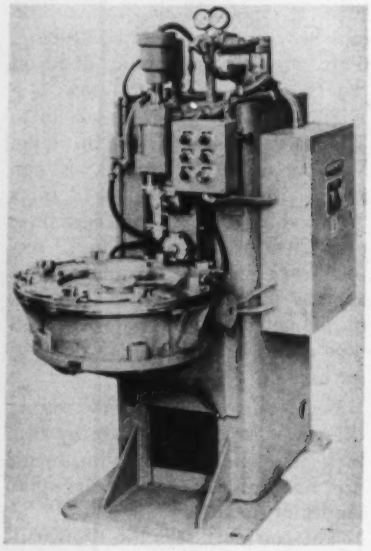
adjustable guide rollers and interchangeable roll heads to shape flat and round bars in addition to angles, tees, and channels.

For further information, *write* Hendley & Whittemore Co., 100 Blackhawk Blvd., S. Beloit, Ill.

Welder Designed for Makers of Small Parts

A WELDING machine has been designed for manufacturers of small steel parts or assemblies. Precision part locating, indexing, and welding are features.

The buyer is asked to specify



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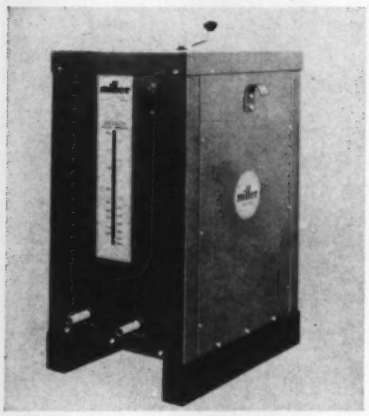
part locating and welding backup tooling on the indexing table. Automatic part orientating and feeding devices may be added.

For further information, *write* Acro Welder Mfg. Co., Milwaukee 3, Wis.

Movable Coils Designed Into Industrial Welders

LITERATURE on the Model 300 and 500 ampere S series ac industrial welders describes them as rugged and maintenance-free.

The units have movable coil de-



sign, 80 watt open circuit, silicon steel cores, Class B insulated copper coils, and dead front construction.

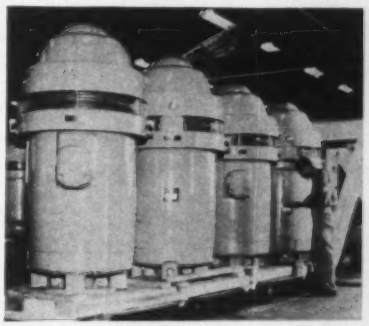
For further information, *write* Miller Electric Mfg. Co., Appleton, Wis.

Pump Motors Are Rated From 100 to 800 hp

RATINGS from 100 to 800 hp are available in weather protected, hollow shaft pump motors (Type HU Holloshaft). Weather protection is in excess of NEMA specifications for Weather Protected Type I.

The units are form wound and are available with standard insulation or with U. S. Everseal silicone rubber which protects windings against adverse environments such as high ambient heat, chemicals, abrasion, moisture, vibration, oxidation, fungus, salt air, spray, oils, detergents, and exposure to extreme weather conditions.

You can get speeds from 400 to



1800 rpm and thrust capacities from 11,280 to 8000 lb. Voltages: 220, 440, and 550 from 100 to 200 hp inclusive and 440, 550, 2300 from 250 through 800 hp. The motors are over 6 ft high and have mounting base diameters of 30½ and 24½ in.

For further information, *write* U. S. Electrical Motors Inc., P. O. Box 2058, Terminal Annex, Los Angeles 54, Calif.

Oscillating Cutting Saw Provides Greater Capacity

IN DESCRIBING the Beaver Pipe saw, the maker says the oscillating feature provides the user with greater cutting capacity. It will cut up to 4 in. solids and most 6 in. shapes.

A 20 hp motor permits cutting at the rate of 3 to 4 seconds per square inch. An air operated power head is available to increase wheel

Capacability means

Imagination

When it comes to oxygen furnace refractories, *imagination* is Basic. And, Basic can be your "fountainhead" of new refractory ideas. Take TARBLOK and TARMIX for example.

Six years ago the first U. S. oxygen steel producer looked to Basic for tar-bonded furnace lining refractories. With four years of intensive research behind us, we were ready. Today, Basic is a fully integrated supplier of these materials — shipping to virtually every oxygen steelmaker in the Western hemisphere.

If you use basic refractories, you can depend on Basic's *capacity* and *ability*. Write for 24-page booklet outlining application of Basic's more than thirty dead-burned dolomites, ramming and gunning refractories, patching materials and tar-bonded linings for basic oxygen furnaces.

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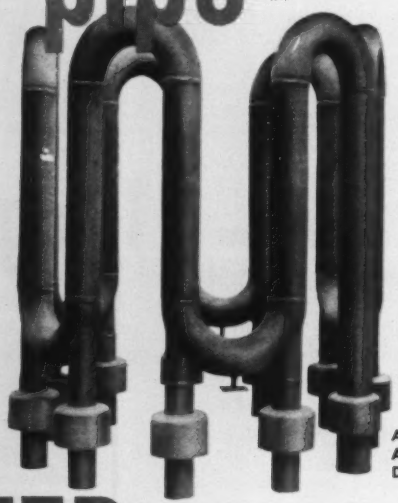
DURASPUN

centrifugally cast pipe



A design of the A. F. Holden Co., Detroit, Mich.

IS BETTER

- *Alloy for alloy, it is stronger than statically cast, rolled or extruded pipe.*
- *Alloy for alloy, it has a denser grain structure.*
- *Alloy for alloy, such pipe or tubing is practically free of blow holes and pockets which are thrown out by the centrifugal force.*

We have shop facilities for assembling centrifugally cast pipe or tubes with other high alloy castings into processing equipment; as for example, the radiant heating unit which is illustrated.

With experience in high alloy static castings going back to 1922 and in centrifugal castings back to 1933, both pioneering starts in this country, our metallurgists and foundry men offer tops in experienced personnel.

Send for Bulletin G-159.

ALLOY CASTING INSTITUTE ACI MEMBER

The DURALOY Company

OFFICE AND PLANT: Scottdale, Pa.

EASTERN OFFICE: 12 East 41st Street, New York 17, N. Y.

CHICAGO OFFICE: 332 South Michigan Avenue

DETROIT OFFICE: 23908 Woodward Avenue, Pleasant Ridge, Mich.

NEW PRODUCTS and equipment

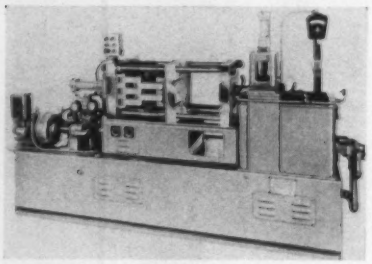
life at least 30 per cent and to provide uniformity of cut.

For further information, *write* Beaver Pipe Tools Inc., Warren, Ohio.

Diecasting Machine Has Doubled Capacity

POSSIBLE output of diecastings has been doubled by a hydraulic combination pump on the Model 150Z diecasting machine. The pump delivers 21.8 gallons per minute. The unit has 150 tons locking pressure.

The diecasting machine completes 1300 free cycles per hour.



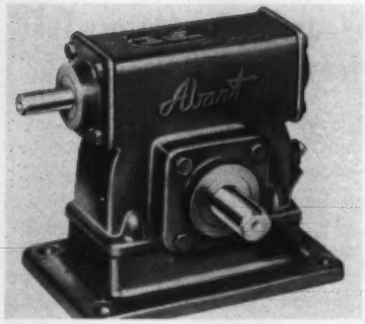
The hydraulics incorporate valving which allows the regulation of pressures between the clamping cylinder and the shot cylinder to be isolated from each other. The safety shot die interlock has also been redesigned for greater safety from molten metal.

For further information, *write* American Die Casting Machinery Co., 1744 W. Winona St., Chicago 40, Ill.

Heavy Duty Speed Reducer Handle Inputs to 2 hp

FOR CONTINUOUS duty work in stokers, conveyors, agitators, spraying equipment, and similar applications, the Abart Type 2—5/8A worm gear speed reducer is recommended. It provides speed ratios from 5-4/5:1 to 100:1 and handles inputs of 1/4 to 2 hp at 1800 rpm and from 1/6 to 1½ hp at 1200 rpm.

The units are reversible right angle drives and may be mounted



in any position. They can be furnished with input or output shafts projecting from either side of the housing or from both sides.

For further information, *write* Dept. SL-3, Abart Gear & Machine Co., 4834-36 W. 16th St., Chicago 50, Ill.

Electrolytic Spindles Operate at 50, 3000 amps

ELECTROLYTIC grinding spindles for operation at 3000 and 50 amperes are available from Pope.

Built-in insulation and a sturdy, fork type brush assembly for cool operation are featured.

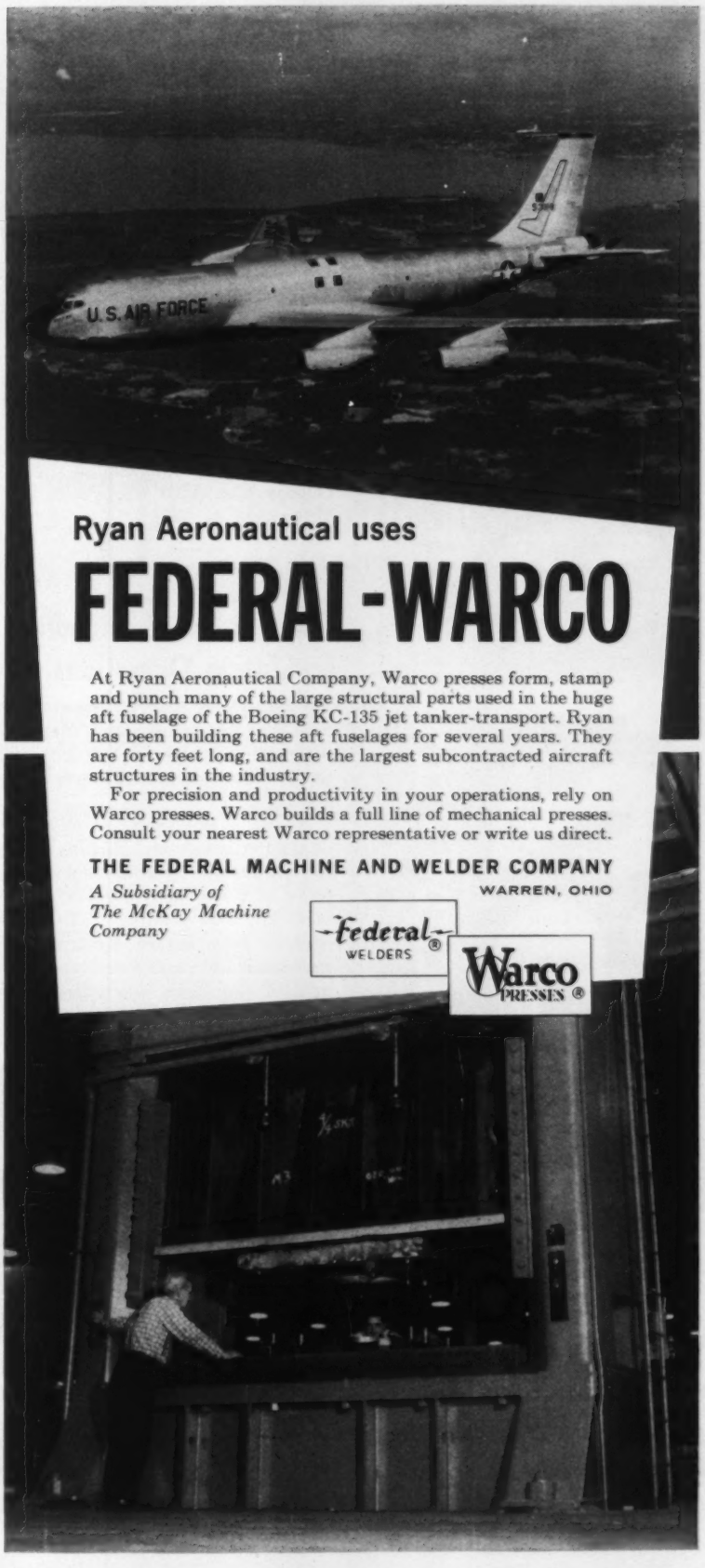
For further information, *write* Pope Machinery Corp., 261 River St., Haverhill, Mass.

Two Stage Servo Valves Feature Precision Control

PRECISE control while handling up to 250 gpm at pressures up to 3000 psi with a pressure drop of 1000 psi is achieved by a high powered servo valve.

With a 3 watt input signal, it is possible to handle up to 300 hp. The valve is 24 in. long, 12 in. wide, and 14 in. high. It weighs about 500 lb.

Also announced are two, two stage servo valves. Capacity of each is 25 gpm at pressures up to 3000 psi with a pressure drop of 1000 psi. They can also be con-



Ryan Aeronautical uses

FEDERAL-WARCO

At Ryan Aeronautical Company, Warco presses form, stamp and punch many of the large structural parts used in the huge aft fuselage of the Boeing KC-135 jet tanker-transport. Ryan has been building these aft fuselages for several years. They are forty feet long, and are the largest subcontracted aircraft structures in the industry.

For precision and productivity in your operations, rely on Warco presses. Warco builds a full line of mechanical presses. Consult your nearest Warco representative or write us direct.

THE FEDERAL MACHINE AND WELDER COMPANY

A Subsidiary of The McKay Machine Company

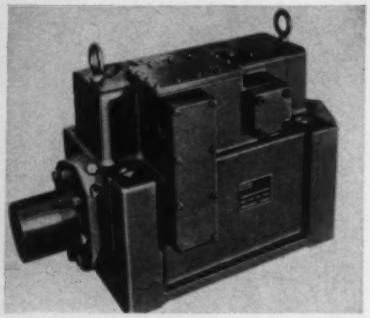
WARREN, OHIO

Federal® WELDERS

Warco® PRESSES

THE 52100 HOUSE
INDUCTION • CONSUMABLE • LEADED
PETERSON STEELS, INC.
Union, N. J. · Wethersfield, Conn.
Detroit, Mich. · Melrose Park, Ill.

NEW PRODUCTS and equipment



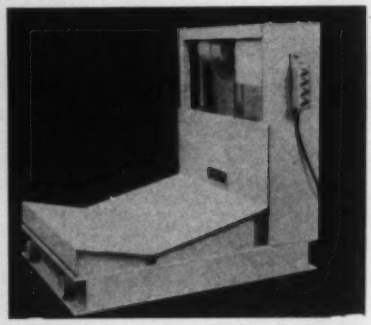
trolled by a low power signal. The valves are 15 in. long, 9 in. wide, and 10 in. high. Weight: 100 lb.

For further information, *write* Oilgear Co., 1560 W. Pierce St., Milwaukee 4, Wis.

Coil Car Speeds Handling In Slitting Operations

AN HOUR or more of production time can be gained each day on slitting lines where the Side Lift coil car is installed, says Braner Engineering.

No pit is needed for installation. Operation is safe and simple. Loading the uncoiler or unloading the recoiler is a one man operation that takes less than 1 minute. The units operate on standard light section steel track and require only about 25 sq ft of clear floor area adjacent to the uncoiler or recoiler for installation.



Basic features: 62 in. diameter coil capacity, sizes from 10 to 20 tons, complete pushbutton control, 15 in. lift in 30 seconds, 30 to 60 fpm linear travel.

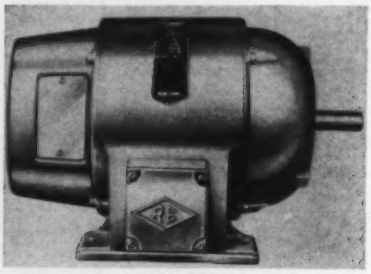
For further information, *write* Braner Engineering Inc., 1316 W. Lake St., Chicago 7, Ill.

Wound Rotor Motors Take Heavy Starting Inertia

A STEP method for starting heavy loads is a feature of wound rotor motors in frame sizes from 182 through 326-U.

Typical applications are found on cranes, hoists, printing presses, elevators, and other machinery where minimum horsepower is sufficient for operation, yet heavy starting inertias must be overcome.

The units are available in all standard horsepower ratings from ½ through 40 plus the following intermediate ratings: 2½, 4, 8¾, 12½, 17½, 22½, 27½, 32½, 35, and 37½. Frames are alloyed aluminum. Mounting can be horizontal, ceiling, or sidewall.



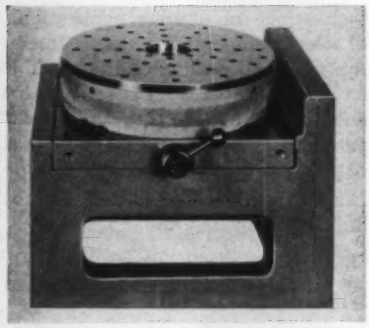
For further information, *write* Reuland Electric Co., Alhambra, Calif., or Howell, Mich.

Rotary Indexing Table Handles Small Jobs

WHOLE degree angular indexing to an accuracy within ¼ second of an arc is claimed for the 7 in. diameter Milichex rotary indexing table.

It can be used by itself or it can be easily built into a machining or checking setup. The table top and base each have 360 ground and lapped teeth that mesh for positive positioning and locking. The unit is designed for smaller jobs, but is identical in operation with the larger models.

In operation, a lever is shifted to raise the table. The top is then rotated to the desired angular position indicated by the scale. The lever is then returned to its original position, lowering and locking the table. The company says wear is no problem, since accuracy in-



creases with wear as teeth lap each other. Sealed design permits use with coolants or lubricants. The top is flat and parallel within 0.000050 in. and has radially dispersed holes for easy attachment of work or fixtures. Over-all dimensions (including base) are 9⅞ x 8 x 8 in.

For further information, *write* Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

Ultrasonic Cleaner with 1¼ qt Tank Plugs In

A BUILT-IN electronic circuit on the Maxson ultrasonic cleaner transmits peak power directly from the transducer to the cleaning tank.

The unit has a 1¼ qt tank and is ready for plug-in operation in a space measuring 6 x 8 in. Power output is 45 watts; power consumption, 140 watts; operating frequency, 70 to 80 kc.

For further information, *write* L & R Mfg. Co., 577 Elm St., Kearny, N. J.

(*Please turn to Page* 88)

Practical Idea for the Production Man

Efficient electric hoists...to move materials overhead and release floor space for more valuable operations.

CM HOISTS

CM LODESTAR ELECTRIC CHAIN HOIST
⅛ to 2 ton capacities—First truly heavy duty version of small electric hoist. ⅛ ton model weighs only 51 lbs. Heavy duty self-adjusting brake. Upper-lower safety limit switches. CM-Alloy load chain.

CM METEOR ELECTRIC WIRE ROPE HOIST
½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

Good Suggestion for the Maintenance Man!

Rugged lightweight hand hoists and pullers...to make your job easier and safer

CM CYCLONE HAND HOIST
¼ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER THE "ONE MAN GANG"
¼ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation. Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds. CM-Alloy flexible load chain.

ALSO... *CM Trolleys and Cranes*

Request catalog and name of local stocking distributor.

CM HOISTS

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CORPORATION
TONAWANDA, NEW YORK
REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND

In Canada: COLUMBUS McKINNON LIMITED, ST. CATHARINES, ONTARIO

NEW PRODUCTS and equipment

(*Continued from Page 87*)

Photoelectric Devices Make Machines Safer

PHOTOELECTRIC equipment announced by Clark Controller has been designed to stop machine operation (presses, shears, brakes) when any part of a person's body enters the danger area.

A wide beam modulated light projector, a wide beam photoelectric receiver, and a control unit are used. The light projector and the photoelectric receiver can be mounted any distance apart up to 15 ft. The equipment is sensitive to partial obstruction and will operate when 2 in. (or more) of the light curtain is obstructed.

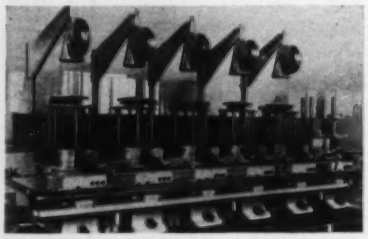
The modulated light beam eliminates the effects of variations in normal ambient light conditions and prevents the use of substitute light to fool the curtain.

To maintain a constant check on each stroke of a press application, a solenoid operated shutter interrupts a small portion of the curtain on each upstroke. If the curtain doesn't respond, the press is stopped automatically.

For further information, *write* Clark Controller Co., 1146 E. 152nd St., Cleveland 10, Ohio.

Machines Do Low Torsion, Nontwist Wire Drawing

AN ADDITION to the Malmedie multiple wire drawing machine line has independent motor drives designed to handle low torsion and nontwist drawing of wire. The motors are mounted below or behind each block.



Each vertical capstan can be independently driven. When the machine is completely threaded up, the machine can be set into operation by engaging automatic controls. A water cooling system supplies both capstans and dies. An additional air cooling system is optional.

The machine features rapid stopping in case of wire breakage or accidents. A central lubricating system is used. Five models are available.

For further information, *write* Straus-Artys Corp., 45 N. Station Plaza, Great Neck, N. Y.

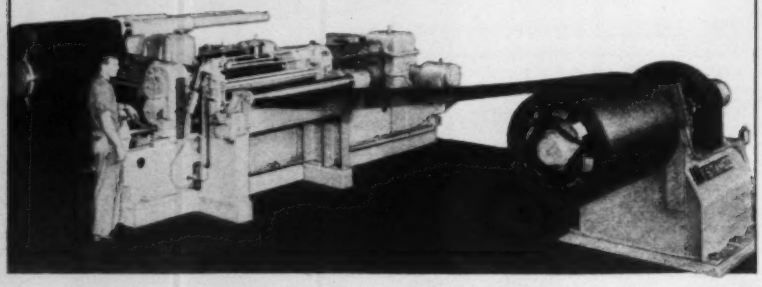
Shears Have Many Uses

A GROUP of shears is recommended for applications such as cropping coil ends, cutting rejected parts from coils, or cutting to length.

The units (Type CU-12-12) are made for hydraulic or compressed air operation. They can be furnished to cut mild steel up to 3/16 x 96 in.

For further information, *write* Curry Air Shear Corp., 1 Gateway Center, Pittsburgh 22, Pa.

Stamco, *slitting and coiling line for coils of 20 thousand lbs. maximum weight, 52 inches maximum width.*



Stamco, a leader in slitting, coiling and shearing equipment, is in a position to furnish equipment to meet any requirement. Trained sales personnel will gladly consult with you. Write for details to:

Stamco, Inc., New Bremen, Ohio, U.S.A.

- **slitting and coiling lines**
- **cut-to-length lines • continuous process lines**
- **power squaring shears • flying shear lines**
- **ferrous or non-ferrous mill equipment**

District Offices, Stamco Sales, Inc.
R. P. Popp, 14001 Intervale, Detroit 27, Michigan
I. W. Spraitzar, 159 Main Street, Chatham, New Jersey
W. E. Heineman, 122 West Burlington Ave., LaGrange, Illinois
W. H. Millan, 11955 Shaker Boulevard, Cleveland 20, Ohio

STEELMAKING AT JESSOP

Listen...

5...4...3...2...1...0...Lift Off!

The countdown is on.

Scientists and skilled technicians scan their instruments, alert to the least sign of malfunction.

Liquid oxygen has been piped into the fuel chamber of the gleaming Atlas ICBM poised on the launching pad. Other last-minute preparations are completed.

Tension mounts. It won't be long. Listen . . .

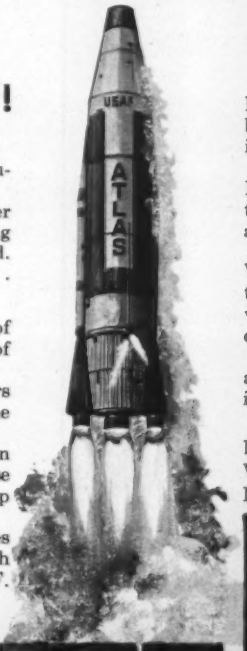
5...4...3...2...1...0...*Lift Off!*

The missile comes to life in a swirling cloud of vapor, exhaust and flame. The engine—capable of 360,000 pounds of thrust—roars thunderously.

Airborne now, the Atlas gathers speed and soars majestically on its predetermined course down the Atlantic range—a successful launching.

Jessop Steel Company makes several alloys used in the Atlas—steels forged and machined into precise but rugged mechanisms. And you will find Jessop steel in the launching pad "plumbing" too.

Swepco Tube Corporation of Clifton, N. J., makes piping for LOX systems that fuel the Atlas with liquid oxygen at temperatures of –300° F. to –320° F. *That's* punishment for any metal.



But Swepco's austenitic chromium nickel Rock-Forged pipe can take it. Ductility—to avoid fracture by reason of brittleness—is an all-important factor in this application.

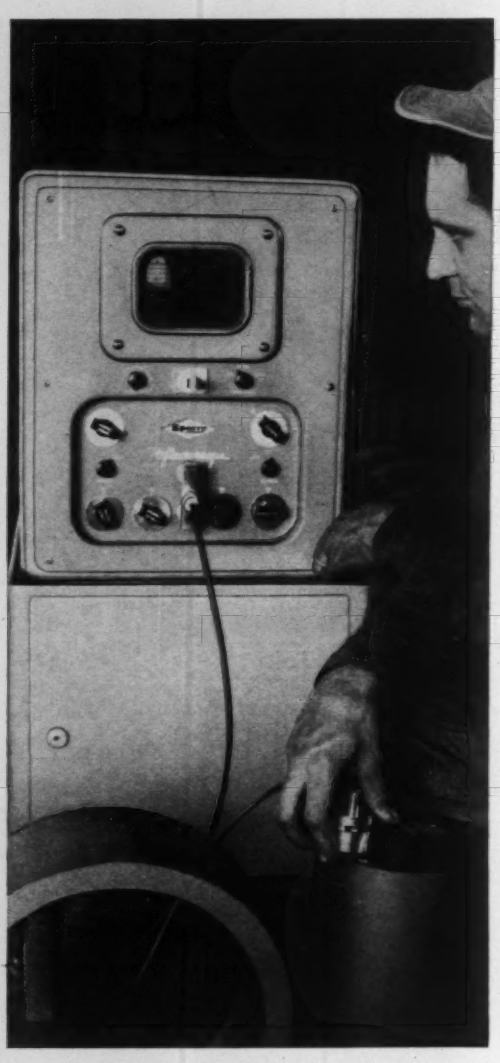
With a value of about 38 foot pounds by Charpy Impact Test, the piping supplied by Swepco handles the job with ease—with an added measure of safety against costly breakdown.

Swepco buys steel from Jessop for rock-forging. Why? Because through controlled chemistry and certain production techniques, Jessop and Swepco developed a steel second to none in workability in the cold forging process.

In making steel like this, experience counts . . . and Jessop has it. Call any of Jessop's 23 sales offices in North America and let us prove it to you.

Plants and Service Centers:
Washington, Pa. • Los Angeles • Chicago • Detroit • Owensboro, Ky. • Wallaceburg, Ont.

JESSOP



Testing a ring forging with the Sperry Ultrasonic Reflectoscope.

A Sperry engineer will be happy to show you how easily a Reflectoscope can be fitted into your production picture and how quickly its low cost can be amortized even by relatively small companies.

"ULTRASONIC TESTING

DIRECTLY RESPONSIBLE FOR INCREASING OUR VOLUME 20%"

—Joseph Mancini, President
Monroe Forgings, Inc.
Rochester, New York

"Nondestructive testing with Sperry Ultrasonic test equipment has widened our sales potential greatly. We credit it with being directly responsible for increasing our volume a full 20%," President Mancini reports.

"Ultrasonic nondestructive testing has become an invaluable asset in many ways. Its capacity to find trouble before it starts has resulted in substantial savings in both production time and material costs. And it has enabled us to expand by effectively competing in fields demanding the utmost in quality and reliability."

Monroe Forgings is but one of hundreds of companies that are finding sure profit, as well as sure protection, in Sperry nondestructive testing.

ULTRASONIC

LEADER IN NONDESTRUCTIVE TESTING — X-RAY

MAGNETIC

SPERRY PRODUCTS COMPANY
DIVISION OF HOWE SOUND COMPANY

903 Shelter Rock Road . Danbury, Connecticut

NEW literature

Write directly to the company for a copy

Transducer Systems

Bulletin TD-105 discusses electronic weigh loading of hot metal, and pelletized ore; electronic weight, force and thrust measuring on aircraft and missiles; strain gage testing of the B-52G and *U.S.S. Albacore;* calibation of transducers used in aerospace and temperature testing to detect failure of machinery parts. Gilmore Industries Inc., 13015 Woodland Ave., Cleveland 20, Ohio.

Silicone Facts

A booklet illustrated with charts, graphs, and photographs, describes silicones, their manifold uses for consumer and industrial products, and suggests ways in which they can be adapted to new applications. Silicones Div., Union Carbide Corp., 270 Park Ave., New York 17, N. Y.

Jig and Fixture Standards

"How 80% of American Companies Can Save Tooling Costs" is the subject of a four page folder. It graphically illustrates and translates (into "dollars and cents") savings in engineering and design time, paperwork and toolroom manhours when standard components are designed into a job and ordered from the distributors' stock. Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland 10, Ohio.

Liquid-Liquid-Vapor Degreasers

Bulletin 22 explains the principles of operation of liquid-liquid-vapor degreasers, then discusses the solvent cycle and the construction of the unit. Included is a table of specifications to be used as a guide for specific degreasing operations. Phillips Mfg. Co. Inc., 3475 W. Touhy Ave., Chicago 45, Ill.

Vibratory Finishers

Principles and applications of vibratory finishers are covered in a seven page booklet. Vibraslide Inc., 95 Prospect Ave., Binghamton, N. Y.

NEW BOOKS

Screw-Thread Standards for Federal Services, 1957, *Part* III, National Bureau of Standards Handbook H28 (1957), amends in part H28 (1944) and its 1950 Supplement, issued Oct. 7, 1960, Superintendent of Documents, Washington 25, D. C., 66 pages, 60 cents

This volume covers acme, stub acme, and buttress threads; rolled threads for screw shells of electric lamp holders and unassembled lamp bases; microscope objective and nosepiece threads; surveying instrument mounting threads; ISO metric threads; miscellaneous threads; Class 5 interference fit threads, trial standard; and wrench openings. The book is the work of the Interdepartmental Screw Thread Committee, sponsored by the Departments of Defense, Army, Navy, Air Force, and Commerce to promote uniformity in screw thread standards.

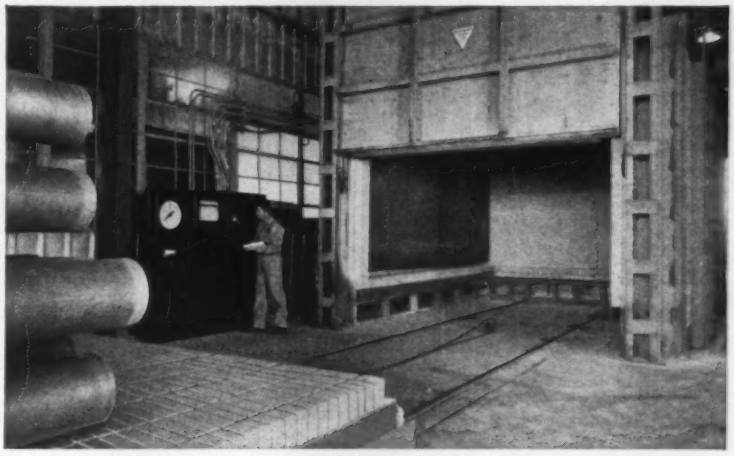
Design of Worm and Spiral Gears, by E. Buckingham and H. H. Ryffel, Industrial Press, 93 Worth St., New York 13, N. Y., 464 pages, $15

Information is offered on how to obtain benefits of improved design in spiral gears (cross axis helical gears) and worm drives through the use of all-recess-action design principles. The book provides a step by step guide to the design of worm and spiral gear drives with all recess action, and presents certain basic principles and practices which enter into the successful design and making of gears and drives.

Embrittlement by Liquid Metals, by W. Rostoker, J. M. McCaughey, and H. Markus, Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y., 170 pages, $7.95

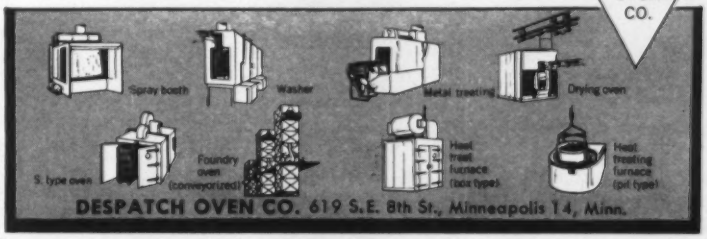
The volume is a result of the experimental work on the mechanism of fracture sponsored by the Armour Research Foundation. An evaluation and review of scattered information and the authors' research results are included. The discussion includes a new approach to liquid metal embrittlement based on modern dislocation theories of brittle fracture.

TEAR MARKS REDUCED IN EXTRUDED ALUMINUM WHEN DESPATCH FURNACE HOMOGENIZES 'LOGS'



An 1150° F. max. (±10°) Despatch direct, gas-fired homogenizing furnace is now used to prepare aluminum for extrusion at Wolverine Tube Division, Calumet & Hecla Inc., Decatur, Alabama. Tear marks have been reduced to a minimum. Production has been increased. Your firm can use the experience and skill of Despatch engineers too. For no-obligation information, write *today!* for free bulletin 100GD.

DESPATCH OVEN CO.



DESPATCH—INDUSTRY LEADERS FOR 58 YEARS

POSITIVE DUPLICATION – EVERY TIME!

These highly accurate apothecary weights give *exact* results, time after time after time. You will get this same kind of Positive Duplication with these center-type grinding wheels, and with *all* CINCINNATI (PD) ° GRINDING WHEELS.

HOW POSITIVE DUPLICATION IS ACHIEVED

The predictable performance of these wheels is the positive result of Cincinnati's unique (PD) manufacturing process. It involves 36 separate quality controls which produce grinding wheels of unsurpassed uniformity. For example, sensitive print-weigh scales put an unmistakable record on each mix card of the exact amounts of materials used. And the figures *must* correspond to the exact amounts called for.

UNIFORMITY HELPS YOU

When you use CINCINNATI (PD) WHEELS you can plan production schedules with the assurance that each reorder wheel will act and grind exactly like the original. This is the promise—and *performance*—of Positive Duplication.

CALL CINCINNATI TODAY

Solve your grinding problems with the help of Cincinnati's factory-trained specialists. Their wide experience in job set-ups and grinding operations is at your service. Just call your CINCINNATI (PD) GRINDING WHEEL Distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

(PD) POSITIVE DUPLICATION

CINCINNATI°

GRINDING WHEELS

°Trade Mark Reg. U. S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

Steelmakers More Optimistic

CONTINUED GAINS in order entry are convincing steelmen that they've passed the low point in a recession that started last May.

Weekly production then was close to 1.9 million ingot tons—equal to 70 per cent of capacity and about normal for the industry on a long term basis. It dropped sharply to 1.2 million tons in the week of July 4, edged up to 1.58 million tons in October, and fell back to 1.1 million tons in the week ended Dec. 31. That was the bottom, steelmakers believe. Since the first of the year, production has risen in every week but two. Output in the week ended Feb. 25 was the largest of any week since the one ended June 25, 1960.

UPTREND TO ACCELERATE—Look for gradual acceleration in steelmaking as spring approaches. Production in the week ended Mar. 11 will probably be slightly higher than the 1,560,000 ingot tons that steel estimates the industry turned out in the week ended Mar. 4. Output then was 1.4 per cent below the 1,582,000 tons poured in the week ended Feb. 25, but the decline did not reflect any weakening in over-all demand. A sharp cutback in the Youngstown district resulted from one steelmaker's decision to bank furnaces while it revamped finishing facilities.

OUTLOOK ENCOURAGING—In the face of automotive cutbacks, steelmakers are getting enough new business from other customers to keep their production on a gradually rising plane. Orders aren't mounting in aggregate tonnage, but they're increasing numerically. That's encouraging, sales executives believe, because it shows that many users have completed their inventory adjustments. When they start using steel at a faster rate, there will be an immediate impact on mill order books.

Currently, improved demand for the major steel products is most apparent in structurals, with sheets, bars, and plates following in that order. Tin plate continues in strong demand as canmakers step up their production. Galvanized sheets are doing well because of a seasonal upturn in demand from farmers.

QUICK DELIVERIES—Thus far, there has been no extension of mill leadtimes. Until that happens—possibly in four to six weeks—there probably won't be any marked acceleration in demand. Buying will increase slowly as milder weather spurs construction, railroad trackwork, shipbuilding, pipelines, and tank fabrication.

AUTO SALES IMPROVE—Although mid-February new car sales were among the lowest in recent years, they gave automakers and their steel suppliers some encouragement. They were 11 per cent above the pace in the first ten days of the month. Dealer inventories dropped slightly.

FARM MACHINERY TO GAIN—Sales forecasts by leading manufacturers of farm machinery and industrial equipment indicate that 1961 will be a good year for those products. Among the comments:

- R. C. Stevenson, president, Allis-Chalmers Mfg. Co.—Gross farm income will at least equal last year's. Granted reasonable weather, farmers will return to normal purchase patterns, and dealers will bring their inventories up to the usual levels. Highway construction should be greater this year than it was in 1960.

- William A. Hewitt, president, Deere & Co.—"We expect a marked improvement in sales for the year, and production schedules have been set accordingly."

WHERE TO FIND MARKETS & PRICES

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Bars, Merchant	97	102
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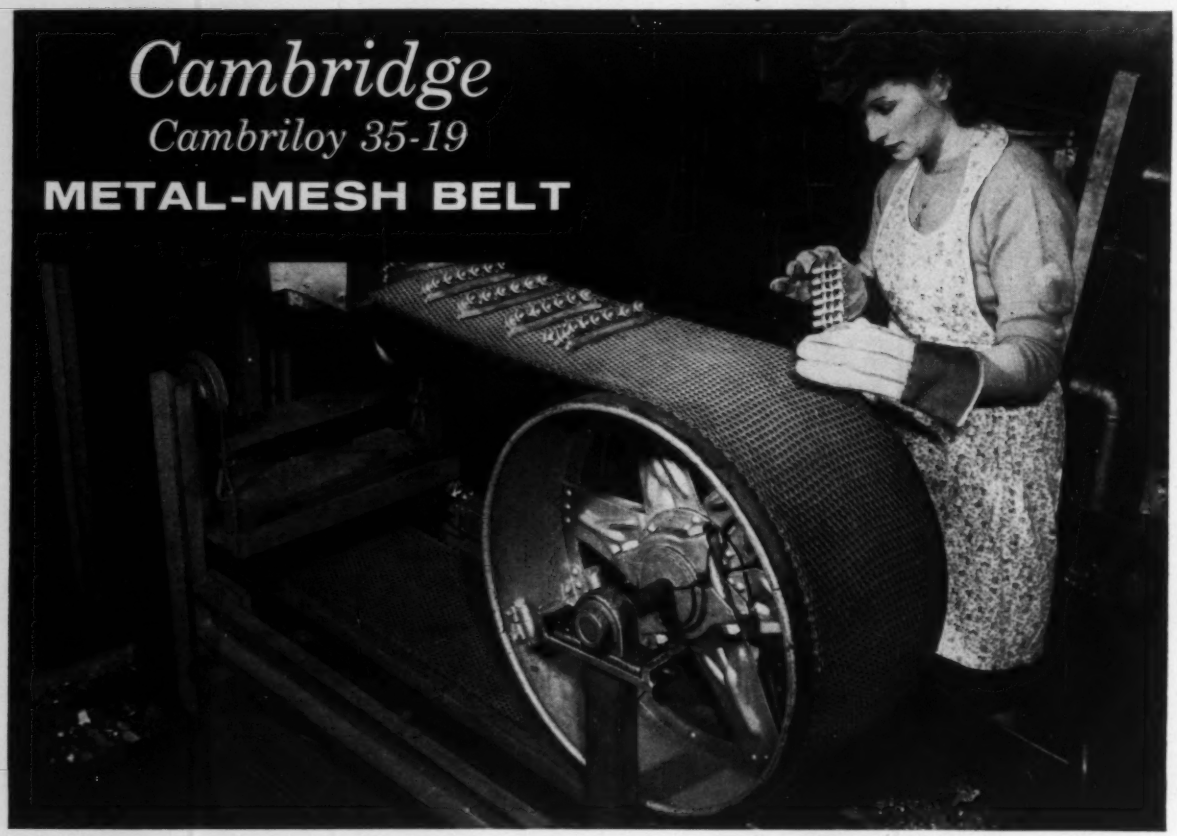
*Current prices were published in the Feb. 27 issue and will appear in subsequent issues.



Fights Flux Attack to Cut Brazing Costs

Because of the severe destructive effects of flux used in aluminum and copper brazing processes, proper alloy selection and quality construction are the only answers to long belt life in this type of operation. Cambridge Cambriloy 35-19 Metal-Mesh Belts have successfully withstood flux attack in many copper brazing installations for as long as 6000 hours, giving users continued production of quality parts while cutting operating and maintenance costs.

There is a complete line of Cambridge Belts in special and standard metals and alloys to meet your specific requirements—custom built in any weave to insure the most efficient processing.

Experienced Cambridge Field Engineers—experts in their field—are available to discuss your needs and help you select the best belt suited to your operations. Or, they can offer you sound advice on the installation, operation and maintenance of your Cambridge Belts. Talk to your Cambridge man soon. He's listed in the Yellow Pages under "Belting, Mechanical." Or, write for free 130-page reference manual.

The Cambridge Wire Cloth Co.

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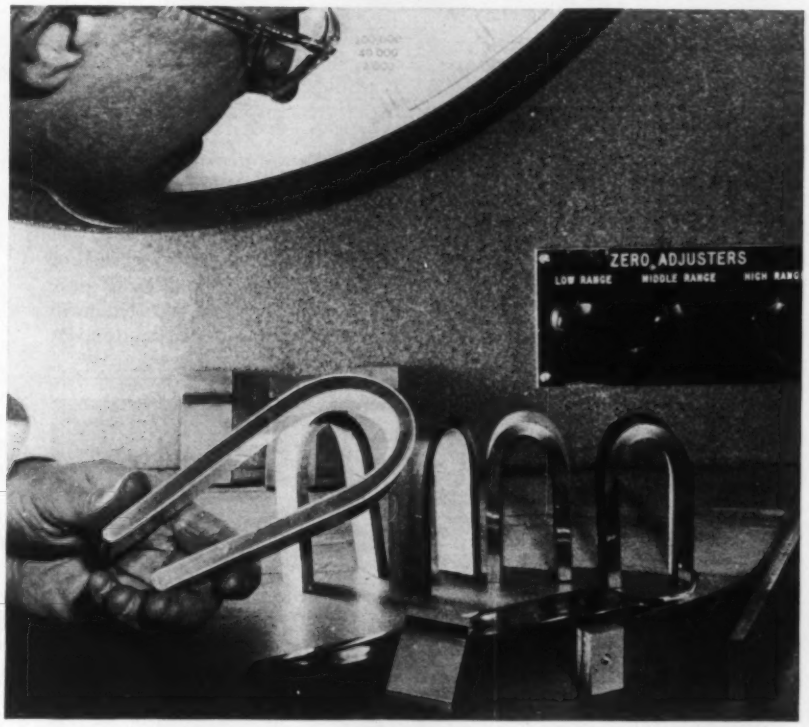
Manufacturers of Metal-Mesh Conveyor Belts, Flat Wire Conveyor Belts, Wire Cloth, Wire Cloth Fabrications, Gripper® Metal-Mesh Slings



You can bend, cut, twist, and shape . . .

New Plastic Clad Steel Plates

PLASTIC CLAD steel plates made their debut last week at the Petrochemical Show of the American Institute of Chemical Engineers in New Orleans.

Up to now, plastic coated steel has been produced only in sheet thicknesses.

The product, introduced by Lukens Steel Co., Coatesville, Pa., has been under development for several years. It's now ready for commercial production. As yet, its price has not been set.

Significance: It could help science break the cost barrier in protecting the product purity of bulk chemicals, or even aid in producing fresh water from sea water.

• **Rolled and Dipped** — Combining the strength of steel with the corrosion resistance of plastic, the product is made of steel plates (either carbon or alloy) that are first rolled on a conventional mill. The plates are then dipped in a bath of vinyl plastic and coated on one or both sides. When one side coating is specified, a special preparation is applied to the other side—it sheds the plastic.

The plastic-steel product is being offered initially in widths up to 96 in. and in thicknesses up to 1 in., and it's available in color.

• **Test Demonstrated**—Its ability to be twisted or bent and to withstand heat up to 150° F and subfreezing temperatures was demonstrated at the Petrochemical Show.

Lukens says the plates can be rolled into tanks or pipes, pressed into heads, or shaped into various forms, and they can be easily welded for fabrication.

• **Many Applications** — Potential uses include piping, storage, and processing tanks for salt water; linings for swimming pools; and plates that form the hulls of large pleasure craft. Many other outdoor applications seem likely.

• **Another Use**—The new product may also be used in the holds of ships where materials or liquids might become contaminated from ordinary steel walls, or might themselves set up a corrosive reaction when exposed to steel surfaces.

Indications are that the plastic clad plates will find a wide range of uses in the petrochemical industry and in a number of capital goods areas where contamination or discoloration may be a factor in storage tanks or vessels.

Platemakers Expecting Second Quarter Pickup

Plate Prices, Page 102

Little important change is noted in demand for plates. Inquiry from the chemical industry for specialties continues to be outstanding. In the Midwest, sellers complain of the absence of welded pipeline business. However, they expect their second

quarter volume will better that in first quarter.

Deliveries of sheared plates are available within ten days to two weeks.

Bidding $496,990, Chicago Bridge & Iron Co., Seattle, is low on a six-million-gallon water reservoir for the Vernon District, Portland, Oreg. The low concrete cylinder bid was $545,900. The award is still pending. At Port Angeles, Wash., concrete cylinder pipe won out over steel plates for a job that would have involved 1000 tons of plates.

Bids close Apr. 24 on a combat store ship, Bureau of Ships, Navy, Washington. The vessel is to be of 16,000 tons displacement fully loaded. It's 581 ft long and has a 79 ft beam. An estimated 3000 tons of plates will be required.

Military Industrial Supply, Navy, Philadelphia, placed orders for 123 tons of stainless plates, 95 tons going to Ingersoll Steel Div., Borg Warner Corp., Chicago, and the remainder to Jessop Steel Co., Washington, Pa.

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you certainly should investigate "SUPER-STEEL"
SHOT OR GRIT

★ It costs only $165.00 per ton, truck loads — considerably less than competitive steel abrasives!

★ It's unequivocally *guaranteed* to equal the performance of all higher priced steel abrasives!

★ It equals, or exceeds, "resistance-to-breakdown" ratings of higher priced steel abrasives!
(Checked on SAE-approved, Mattson-Cargill shot life testers.)

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(Should you desire first-hand information from actual users of "Super-Steel", write us for names of firms in your area.)

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Spring Pickup Anticipated By Alan Wood's President

Sharp cutbacks in orders from the automotive industry will adversely affect first quarter earnings of Alan Wood Steel Co., Conshohocken, Pa., says Harleston R. Wood, president. His forecast: Earnings in the period will be below those in the December (1960) quarter.

On the bright side, Mr. Wood notes what might be termed a slight pickup in the company's nonautomotive business, though volume is not particularly large. Cold rolled steel demand is improving more than is demand for either hot rolled or plates.

Alan Wood Steel is operating at about 50 per cent of capacity, workers averaging somewhat less than a 5 day week. Bad weather forced a two week shutdown of the company's ore mining operations in Northern New Jersey. It also slowed construction of new blooming and plate mill facilities. Alan Wood's 1960 capital expenditures were about $17.5 million, and its 1961 spending will be about the same. The company expects to have its new wide plate producing mill in operation this summer.

Alan Wood's president looks for a general upturn in the economy some time this spring. He feels a number of business decisions had been put off pending the outcome of the election and some indication of the aims of the new administration.

Foreign competition continues to hurt Alan Wood's pig iron sales, which are off primarily because foreign iron is underselling domestic by $20 a ton. Mr. Wood says some steel plates are being brought into the country, though foreign producers still don't have a significant part of that market yet.

Tubular Goods . . .

Tubular Goods Prices, Page 106

The number of rotary, oil drilling rigs in operation in the U. S. and Canada rose 76 in the latest weekly survey by the Hughes Tool Co. The total was 1750—1553 rigs in the U. S., up 74, and 197 in Canada, up two.

Order volume has improved, and

the outlook is considerably brighter, an executive of Youngstown Sheet & Tube Co., Youngstown, reported last week. He explained that his company has booked new orders for oil country goods, and demand for standard pipe and tin plate has improved.

Orders for oil country goods are mainly to replace depleted inventory of oil and gas drillers. The improvement in standard pipe is in anticipation of a spring revival in construction.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 103 & 104

Sheetmakers report a slow but steady gain in orders, despite the serious lag in automotive requirements. Some mills booked more tonnage in February than they did in January, while others were lucky to equal their January volume after sustaining sharp automotive cutbacks.

Automotive demand for March remains a question mark. Some mills say orders they've received to date are down from last month's. Others are talking hopefully about small business. But even if there's no upturn in demand from the car companies, most steelmen expect their sales and shipments in March will surpass those in February by 10 to 15 per cent.

Makers of metal furniture, appliances, and outdoor equipment are buying sheets a little more actively than they were. Shops fabricating metal signs are increasing their orders for light gage sheets—both highway and commercial requirements are reported heavier. The Forest Service, Department of Agriculture, is closing on 30 gage stock Mar. 7. The total: 118,165 units, 19 different types.

Rheem Mfg. Co., Linden, N. J., has been awarded a contract for 55 steel drums (enameled exterior) by the Army Quartermaster Depot, Richmond, Va., at $2,790,017. The drums, totaling 287,930 gallons capacity, will be of 16 gage sheets.

Steel Bars . . .

Bar Prices, Page 102

February sales of forging quality hot rolled bars were disappointing. One producer, after watching its January shipments spurt to the highest level in nine months, saw its February shipments drop 10 per cent. Principal cause: Reduced automotive demand.

Whether the automakers will buy more steel in March than they did in February remains to be seen. Two divisions of General Motors Corp. that shut down for a week in February are reportedly planning to do the same this month.

Most of the orders being booked are small and call for quick delivery. Users are continuing to cut their inventories, but a recent surge of business from buyers who've been out of the market for months indicates that liquidation is tapering off.

Eastern sellers of hot carbon bars note greater pressure for quick shipments, but they describe orders as small and spotty. There is no particular activity in any one size or specification.

Deliveries continue easy, ranging one to four weeks on hot bars. Prompt shipments are available on cold drawn bars; buyers report little

HOW TO SAVE
$17,360 per year
ULTRASONICALLY

An experimental installation for removal of residual smudge from shot blasted strip by means of ultrasonics. A joint project of Pangborn Corp., Wean Engineering Co., Inc., and Branson Instruments, Inc.

The shotblast method of descaling strip is becoming more and more popular, especially among the lower tonnage producers, converters and fabricators. In this process, hot bands are descaled in a blast cabinet with abrasive shot.-Today ultrasonic cleaning is on the way to replacing flash pickling. This method, which eliminates stream pollution and acid disposal, offers many extras:

• LOW INITIAL INVESTMENT (for tanks due to inexpensive steel construction) • LOW MAINTENANCE COSTS • LOW OPERATING COSTS (in terms of heat and power input) • REDUCED OPERATING TEMPERATURES • LITTLE OR NO CORROSION • NO FUME REMOVAL • NO ACID DISPOSAL • SPACE SAVING (ultrasonic installations are shorter in length).

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BRANSON INSTRUMENTS, INC.
Ultrasonic Power Division
36 Brown House Road, Stamford, Conn.

difficulty getting tonnage within a week in most cases. Alloy bars, both hot and cold, can be had within two to four weeks.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 103

Distributors' backlogs of reinforcing steel orders are lower and unevenly spread throughout the industry. However, slightly more tonnage is being estimated, largely bridges.

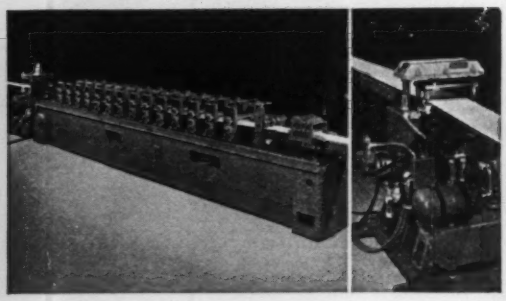
To some extent, the low backlogs reflect price competition over recent months. Shops that have been shading quotations hold a fair volume of orders against which mill shipments of steel are prompt.

A Southern barmaker has increased the size of his concrete bar range from 1¼ in. to 2 in. in diameter. Roll shop equipment for production of the larger bars has been installed. The larger bars are being sold to missile bases.

AMERICAN ROLLER DIE CORP
ARDCOR

PRODUCTION EQUIPMENT
produces MILLIONS of SQUARES
of

ALUMINUM SIDING



ARDCOR typical production line includes Coil Reel, Prenotch Press, Leveller and Roll Forming Machine—with Rotary Punching Unit for piercing nail and weep holes or slots, Cut-off Press and Runout Table.

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DESIGNERS, ENGINEERS AND BUILDERS: Single Roll Forming Machines or Completely Automated Production Lines for Cold Forming, Ferrous and Non-Ferrous Electric Weld and Lock Seam Tube Mills • Forming Rolls, Tubing and Pipe Rolls • Straightening, Pinch and Leveller Rolls • Cut-Off Machines • Slitters

Tool Steel . . .

Tool Steel Prices, Page 106

Shipment of tool steels (excluding hollow drill steel) totaled 86,784 net tons in 1960 compared with 96,069 tons in 1959, reports the American Iron & Steel Institute.

Shipments in December, 1960, came to 5697 tons vs. 9210 tons in December, 1959.

Tool Steel Shipments
(Net tons)

Classifications	Dec., 1960	Year 1960
HIGH SPEED TOOL STEELS		
Molybdenum types		
M2, M8	449	6,412
M3, M4	81	1,060
M1, M7	350	4,741
M10	183	1,779
M6, M15, M30, M34, M35, M36, other M	40	578
Tungsten types		
T1, T2, T3, T7, T9	71	1,293
T4, T5, T6, T8, T15	43	617
Totals	1,217	16,480
HOT WORK TOOL STEELS		
Chromium types		
H11, H12, H13	692	8,978
H20, H21, H22, H23, H24, H25, H26	43	660
Miscellaneous types		
H14, H15, H16, H41, H42, H43	138	1,417
Totals	873	11,055
CHROMIUM DIE TOOL STEELS		
High chromium types		
D1, D2, D3, D4, D5, D6, D7	399	6,195
Medium chromium types		
A2, other	263	4,163
Low chromium types		
A4, A5, A6	93	1,216
Totals	755	11,574
OIL HARDENING TOOL STEELS		
O1, O2, O6, O7,	902	15,643
SHOCK RESISTING TOOL STEELS		
S1, S2, S3, S4, S5, other S	300	5,892
SPECIAL PURPOSE ALLOY TOOL STEELS		
L1, L2, L3, L4, L5, L6, L7, F1, F2, and F3; other alloy	927	13,355
WATER HARDENING TOOL STEELS		
W1, W2, W3, W4, W5, W6, W7	993	17,806
Totals (including exports and conversion shipments)	5,967	91,805
Conversion shipments	270	5,021
Net shipments	5,697	86,784

Data from American Iron & Steel Institute.

Tin Plate . . .

Tin Plate Prices, Page 104

The seasonal uptrend in tin plate demand is certain to accelerate as the month advances. February shipments to canmakers included sizable tonnages from mill inventories, but this month's deliveries will require producers to boost their production.

Tinning lines at most mills are running 60 per cent of capacity or better. First quarter shipments will be substantially higher than those of the fourth quarter of last year, and it's expected that second quarter shipments will top those in the first three months by a good margin—but that's the normal pattern.

If this year's shipments of tin mill products are to equal last year's 6 million tons—and some sales exec-

utives think that's a conservative forecast—the industry will have to ship more base boxes than it did in 1960. Reason: Ultrathin tin plate weighs only a little more than half as much as the material it's displacing.

Blast Furnace Production During January Increased

Blast furnace output (pig iron and ferroalloys) in January totaled 4,068,812 net tons—29,518 tons were ferromanganese and spiegeleisen, reports the American Iron & Steel Institute. Output in the preceding month was 3,876,776 tons (35,617 being ferromanganese and spiegeleisen), while production totaled 7,830,097 tons (76,344 ferromanganese and spiegeleisen) in January, 1960.

The breakdown of production by states:

Blast Furnace Production—January, 1961

(Net tons)

(Pig Iron, Ferromanganese, Spiegeleisen)

States	Jan., 1961	Jan., 1960
Massachusetts, New York	198,291	498,085
Pennsylvania	983,429	2,186,470
Maryland, Virginia, W. Virginia	395,446	656,203
Kentucky, Tennessee, Texas	75,118	167,321
Alabama	277,671	417,440
Ohio	686,563	1,509,069
Indiana	561,197	848,773
Illinois	295,648	695,827
Michigan, Minnesota, Colorado, Utah,	301,696	473,482
California	293,753	377,427
Total	4,068,812*	7,830,097**

*Includes 29,518 tons of ferromanganese and spiegeleisen.
**Includes 76,344 tons of ferromanganese and spiegeleisen.
Data from American Iron & Steel Institute.

Pig Iron . . .

Pig Iron Prices, Page 107

Slow foundry business is hurting the merchant iron trade. Foundries are able to get pig iron shipments on short notice. Production of merchant iron continues on a curtailed basis.

Of 43 stacks in the Chicago District, 22 are active. Inland Steel relighted its No. 2 stack at Indiana Harbor Feb. 28. Two weeks ago, U. S. Steel reactivated a stack at Gary and one at its South Works in South Chicago.

Consolidated Mining & Smelting Co. has shipped its first pig iron from its recently completed plant at Kimberly, B. C. Output is expected to compete with imports from Australia and South Africa.

Iron ore . . .

Iron Ore Prices, Page 108

Imports of iron ore in November (1960) totaled 2,010,144 long tons valued at $18,536,225, reports the U. S. Census Bureau. That compares with imports of 3,180,899 tons valued at $33,969,680 in the same month of 1959.

The tonnage imported in January-November (1960) amounted to 33,064,316 tons valued at $307,484,376. It compares with 32,611,453 tons valued at $285,392,422 imported in the same period of the preceding year. Comparative imports in the first 11 months of 1960-1959 by country of origin:

Iron Ore Imports

(Gross tons)

Source	11 Months 1960	11 Months 1959
Angola	16,500	.....
Brazil	1,357,078	1,134,669
British W. Africa	45,779	62,071
Canada	10,499,068	13,041,133
Chile	3,670,782	3,300,203
Cuba	2,820	1,600
Denmark	862	554
Dominican Republic	.....	50,370
Iran	1,968	2,756
Western Africa (1)	5,672	.....
Liberia	864,721	923,596
Mexico	144,720	84,861
Norway	.....	14,690
Peru	2,741,870	1,880,714
Philippines	1,000	70,998
Portuguese Asia	56,900	.....
Spain	260	209
Surinam	.....	2,320
Sweden	80,631	66,045
United Kingdom	148	18,954
Venezuela	13,590,037	11,939,210
Totals	33,064,316	32,611,453

(1) Formerly reported as Republic of Guinea.
Reported by the U. S. Bureau of the Census.

Distributors . . .

Prices, Page 107

Steel service center operators anticipate a pickup in business this month. Optimism is based on the likelihood of a slightly better daily average, plus a greater number of working days than in February. They believe there will be some improvement in metalworking activity. Seasonal gains are expected in plates and structurals.

January sales of a service center specializing in flat rolled products were up substantially from those in each of the proceding three months. Its business slackened some in February. Among the best sellers are specialty items, such as prepainted and preplated sheets.

Wire . . .

Wire Prices, Pages 104 & 105

Carbon wire and specialty demand is spotty. Some government contracts are being placed; two fair-

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When it comes to furnace maintenance refractories, *dependability* is Basic. You won't need the "Alpine Rescue Squad" if you rely on Basic's dead-burned dolomites, MAGNEFER and SYNDOLAG. For more than 40 years steelmakers have known these products as the standard of comparison for heat-to-heat furnace repair.

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sized stainless orders went to Brookfield Wire Co. Inc., West Brookfield, Mass., and Techalloy Co., Rahns, Pa.

Military Industrial Supply, Navy, Philadelphia, closed on 347 tons of carbon wire Feb. 28, and set aside another 365 tons for small suppliers. It is also closing Mar. 21 on 115 tons of electrode welding wire, supplementing several contracts that have been placed.

Some sellers of merchant wire products say demand is improved because of a pickup in agricultural requirements. However, business in general continues disappointing, and most merchant products are available for prompt shipment from stock.

Iron-Steel Production in Canada Rises in January

Production of steel and pig iron in Canada is again rising, following a decline in the closing months of 1960.

January output of steel ingots was reported at 451,540 tons, 73.1 per cent of rated capacity compared with 346,242 tons, 56 per cent of capacity, in December, 1960.

Pig iron production during the month was reported at 331,987 tons, up noticeably from the 294,640 tons reported for December. In January, 1960, output was 374,523 tons.

Steel Ingot Production Declines 1.4 Per Cent

STEEL estimates production for the week ended Mar. 4 at 1,560,000 tons, a decline of 1.4 per cent from the preceding week when output came to 1,582,000 tons.

That marks the fourth consecutive week when ingot production topped the 1.5 million ton level, the highest since last October. Only minor week-to-week changes are recorded in most districts, including Cleveland, Northeastern, Buffalo, Cincinnati, and St. Louis.

The over-all trend over the next few weeks is expected to be slightly upward with a possible acceleration in late spring when warmer weather will permit a spurt in construction.

• **Youngstown** — Ingot production has been curtailed. Chief reason: The suspension of steelmaking at Youngstown Sheet & Tube Co.'s Campbell (Ohio) Works. The company is changing over its 79 in. hot strip mill and enlarging the blooming mill to handle larger slabs. At a later date, the Brier Hill Works, Youngstown, will be shut down to enlarge the blooming mill. The improvement is part of a $60 million program.

• **Los Angeles**—Although a drop in production is forecast for the week ended Mar. 4 in this district, steelmakers are optimistic about a pickup in the spring.

• **Detroit**—Steel ingot production was expected to show a small decline here in the week ended Mar. 4. A slight pickup in March business has been noted, but a cutback in April is likely to develop.

• **Pittsburgh** — Ingot output increased about 9000 tons here in the week ended Mar. 4, based on estimates by STEEL. That reflects an improvement in business reported by several producers of finished material.

• **Birmingham**—Major steelmakers planned to increase their operations here in the week ended Mar. 4, lifting the district's rate to 62.5 per cent of the Jan. 1, 1960, capacity figure. A pickup in pipe orders is reportedly the main factor.

• **Chicago** — The steelmaking index here was expected to rise to 94.5 (weekly average in 1957-59 = 100) for the week ended Mar. 4. Orders for steel products are increasing moderately, and last minute placing of tonnage is being translated into increased ingot production.

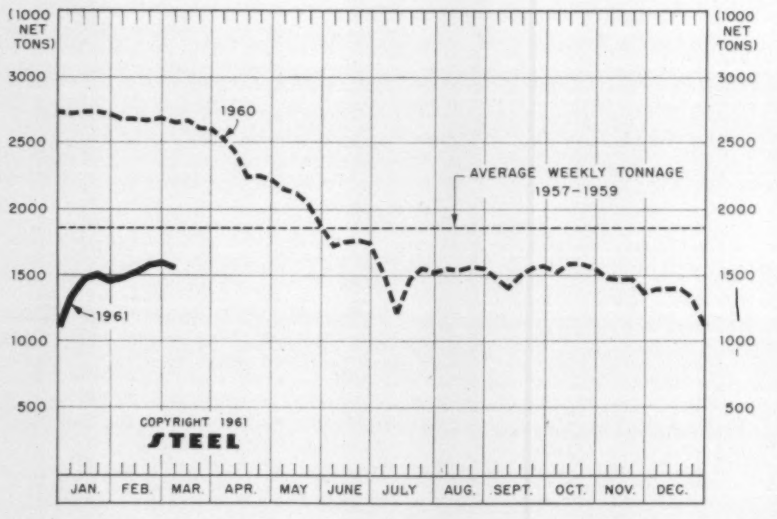
• **Cleveland**—Latest data show output in this district at an estimated 66,668 tons weekly, the Institute's index for the area being stated at 72. That was down from the preceding week when it stood at 77. Production has been holding in a narrow range (65,000 to 72,000 tons weekly) for the last several weeks.

STEEL INGOT PRODUCTION

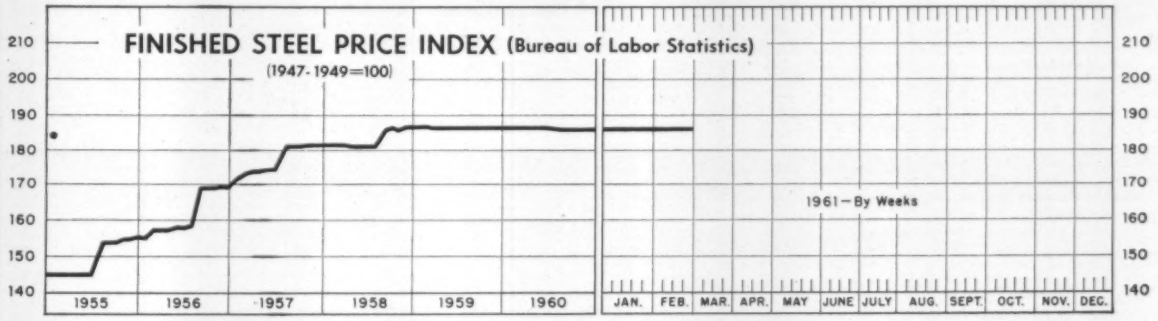
Weeks Ended	Net Tons	Change
Mar. 4	1,560,000*	— 1.4%
Feb. 25	1,582,000	Unch.
Feb. 18	1,582,000	+ 3.8%
Totals to Feb. 25		
1961	11,988,000	—44.6%
1960	21,620,000	

DISTRICTS	Week Ended Feb. 25 Tons‡	Week Ended Feb. 25 Index†	Week Ended Feb. 18 Index†
Northeastern	224,445	84	84
Buffalo	70,096	72	74
Pittsburgh	302,662	75	75
Youngstown	134,285	79	83
Cleveland	66,668	72	77
Detroit	93,376	89	91
Chicago	347,891	93	91
Cincinnati	67,865	90	92
St. Louis	56,229	107	105
Southern	97,556	90	88
Western	118,082	101	99
Industry	1,582,000	84.9	84.9

*Estimated by STEEL. †1957-59=100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Feb. 28, 1961	Week Ago	Month Ago	Feb. Index	Year Ago
186.2	**186.2**	**186.2**	**186.2**	**186.8**

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Feb. 28

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	6.335
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.489
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe, Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
		Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (Bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.372
		Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Mar. 1 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	209.10
Index in cents per lb	6.713	6.713	6.713	6.713	5.665

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.02
No. 2 Fdry, Pig Iron, GT.	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT	35.67	34.00	32.67	35.00	48.17

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Mar. 1 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.90
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.25
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	4.88
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.80
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.25-6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.60
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, $\frac{7}{32}$-$\frac{1}{2}$" Pitts.	6.40	6.40	6.40	6.40	5.375

PIG IRON, Gross Ton	Mar. 1 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.07	62.16
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.57	62.66
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	205.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$34.50	$31.50	$31.50	$35.50	$47.50
No. 1 Heavy Melt, E. Pa.	39.00	39.00	36.00	36.00	50.00
No. 1 Heavy Melt, Chicago	33.50	31.50	30.50	33.50	47.00
No. 1 Heavy Melt, Valley	36.50	32.50	32.50	37.50	52.50
No. 1 Heavy Melt, Cleve.	33.50	29.50	28.50	34.50	49.50
No. 1 Heavy Melt, Buffalo	27.50	27.50	27.50	31.50	46.50
Rails, Rerolling, Chicago	56.50	54.50	54.50	57.50	65.50
No. 1 Cast, Chicago	42.50	41.50	41.50	47.50	46.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.125
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	27.50

Steel Prices

Mill prices as reported to STEEL, Mar. 1, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 103; footnotes, page 105.

SEMIFINISHED

INGOTS, Carbon Forging (NT)

Munhall, Pa. U5 ....$76.00

INGOT, Alloy (NT)

Detroit S41 .....$82.00
Economy, Pa. B14 ....82.00
Farrell, Pa. S3 .....82.00
Lowellville, O. S3 .....82.00
Midland, Pa. C18 .....82.00
Munhall, Pa. U5 .....82.00
Sharon, Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)

Bartonville, Ill. K4 ....$82.00
Bessemer, Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton, Pa. U5 .....80.00
Ensley, Ala. T2 .....80.00
Fairfield, Ala. T2 .....80.00
Fontana, Calif. K1 ....90.50
Gary, Ind. U5 .....80.00
Johnstown, Pa. B2 .....80.00
Lackawanna, N.Y. B2 ..80.00
Munhall, Pa. U5 .....80.00
Owensboro, Ky. G8 ....80.00
S. Chicago, Ill. R2, U5 ..80.00
S. Duquesne, Pa. U5 ....80.00
Sterling, Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)

Bessemer, Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton, O. R2 .....102.00
Clairton, Pa. U5 .....99.50
Conshohocken, Pa. A3 .104.50
Ensley, Ala. T2 .....99.50
Fairfield, Ala. T2 .....99.50
Farrell, Pa. S3 .....99.50
Fontana, Calif. K1 ...109.00
Gary, Ind. U5 .....99.50
Geneva, Utah C11 ....99.50
Houston S5 .....104.50
Johnstown, Pa. B2 ....99.50
Lackawanna, N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland, Pa. C18 .....99.50
Munhall, Pa. U5 .....99.50
Owensboro, Ky. C8 ....99.50
Seattle B3 .....109.00
Sharon, Pa. S3 .....99.50
S. Chicago R2, U5, W14 .99.50
S. Duquesne, Pa. U5 ....99.50
S. SanFrancisco B3 ....109.00
Warren, O. C17 .....99.50

Alloy, Forging (NT)

BethlehemPa. B2 ...$119.00
Bridgeport, Conn. C32..119.00
Buffalo R2 .....119.00
Canton, O. R2, T7 ....119.00
Conshohocken, Pa. A3 .126.00
Detroit S41 .....119.00
Economy, Pa. B14 .....119.00
Farrell, Pa. S3 .....119.00
Fontana, Calif. K1 ....140.00
Gary, Ind. U5 .....119.00
Houston S5 .....124.00
Ind. Harbor, Ind. Y1 ....119.00
Johnstown, Pa. B2 ....119.00
Lackawanna, N.Y. B2..119.00
LosAngles B3 .....139.00
Lowellville, O. S3 .....119.00
Massillon, O. R2 .....119.00
Midland, Pa. C18 .....119.00
Munhall, Pa. U5 .....119.00
Owensboro, Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon, Pa. S3 .....119.00
S. Chicago R2, U5, W14 .119.00
S. Duquesne, Pa. U5 ....119.00
Struthers, O. Y1 .....119.00
Warren, O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 .....$122.50
Canton, O. R2 .....125.00
Cleveland R2 .....122.50
Gary, Ind. U5 .....122.50
S. Chicago, Ill. R2, W14 .122.50
S. Duquesne, Pa. U5 ....122.50
Warren, O. C17 .....122.50

SKELP

Aliquippa, Pa. J5 .....5.05
Benwood, W.Va. W10 ...5.05
Ind. Harbor, Ind. Y1 ....5.05
Munhall, Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren, O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS

AlabamaCity, Ala. R2 ...6.40
Aliquippa, Pa. J5 .....6.40
Alton, Ill. L1 .....6.60
Bartonville, Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora, Pa. A7 .....6.40
Fairfield, Ala T2 .....6.40
Houston S5 .....6.65
IndianaHarbor, Ind. Y1 .6.40
Johnstown, Pa. B2 .....6.40
Joliet, Ill. A7 .....6.40
KansasCity, Mo. S5 ....6.65
Kokomo, Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa, Colo. C10 ....6.65
Monessen, Pa. P7 .....6.40
Pittsburg, Calif. C11 ....7.20
Portsmouth, O. P12 ....6.40
Roebling, N.J. R5 .....6.50
S. Chicago, Ill. R2, W14..6.40
SparrowsPoint, Md. B2..6.50
Sterling, Ill. (1) N15 ....6.40
Sterling, Ill. N15 .....6.50
Struthers, O. Y1 .....6.40
Worcester, Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes

AlabamaCity, Ala. R2 ...5.50
Aliquippa, Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer, Ala. T2 .....5.50
Bethlehem, Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton, Pa. U5 .....5.50
Fairfield, Ala. T2 .....5.50
Fontana, Calif. K1 .....6.30
Gary, Ind. U5 .....5.50
Geneva, Utah C11 .....5.50
Houston S5 .....5.60
Ind. Harbor, Ind. I-2, Y1.5.50
Johnstown, Pa. B2 .....5.55
Joliet, Ill. P22 .....5.50
KansasCity, Mo. S5 ....5.60
Lackawanna, N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa, Colo. C10 ....5.80
Munhall, Pa. U5 .....5.50
Niles, Calif. P1 .....6.25
Phoenixville, Pa. P4 ....5.55
Portland, Oreg. O4 .....6.25
Seattle B3 .....6.25
S. Chicago, Ill. U5, W14 .5.50
S. SanFrancisco B3 .....6.15
Sterling, Ill. N15 .....5.50
Torrance, Calif. C11 ....6.20
Weirton, W.Va. W6 ....5.50

Wide Flange

Bethlehem, Pa. B2 .....5.55
Clairton, Pa. U5 .....5.50
Fontana, Calif. K1 .....6.45
IndianaHarbor, Ind. I-2..5.50
Lackawanna, N.Y. B2 ..5.55
Munhall, Pa. U5 .....5.50
Phoenixville, Pa. P4 ....5.55
S. Chicago, Ill. U5 .....5.50
Sterling, Ill. N15 .....5.50
Weirton, Wa.Va. W6 ....5.50

Alloy Std. Shapes

Aliquippa, Pa. J5 .....6.80
Clairton, Pa. U5 .....6.80
Gary, Ind. U5 .....6.80
Houston S5 .....6.90
Munhall, Pa. U5 .....6.80
S. Chicago, Ill. U5, W14..6.80

H.S., L.A., Std. Shapes

Aliquippa, Pa. J5 .....8.05
Bessemer, Ala. T2 .....8.05
Bethlehem, Pa. B2 .....8.10
Clairton, Pa. U5 .....8.05
Fairfield, Ala. T2 .....8.05
Fontana, Calif. K1 .....8.85
Gary, Ind. U5 .....8.05
Geneva, Utah C11 .....8.05
Houston S5 .....8.15
Ind. Harbor, Ind. I-2, Y1..8.05
Johnstown, Pa. B2 .....8.10
KansasCity, Mo. S5 ....8.15
Lackawanna, N.Y. B2 ..8.10
LosAngeles B3 .....8.75
Munhall, Pa. U5 .....8.05
Seattle B3 .....8.80
S. Chicago, Ill. U5, W14..8.05
S. SanFrancisco B3 ....8.70
Sterling, Ill. N15 .....7.75
Struthers, O. Y1 .....8.05

H.S., L.A., Wide Flange

Bethlehem, Pa. B2 .....8.10
Ind. Harbor, Ind. I-2 ....8.05
Lackawanna, N.Y. B2 ..8.10
Munhall, Pa. U5 .....8.05
S. Chicago, Ill. U5 .....8.05
Sterling, Ill. N15 .....7.75

PILING

BEARING PILES

Bethlehem, Pa. B2 .....5.55
Ind. Harbor, Ind. I-2 ....5.50
Lackawanna, N.Y. B2 ..5.55
Munhall, Pa. U5 .....5.50
S. Chicago, Ill. I-2, U5 ..5.50

STEEL SHEET PILING

Ind. Harbor, Ind. I-2 ....6.50
Lackawanna, N.Y. B2 ..6.50
Munhall, Pa. U5 .....6.50
S. Chicago, Ill. I-2, U5 ...6.50
Weirton, W.Va. W6 .....6.50

PLATES

PLATES, Carbon Steel

AlabamaCity, Ala. R2 ...5.30
Aliquippa, Pa. J5 .....5.30
Ashland, Ky. (15) A10 ...5.30
Atlanta A11 .....5.50
Bessemer, Ala. T2 .....5.30
Clairton, Pa. U5 .....5.30
Claymont, Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville, Pa. L7 .....5.30
Conshohocken, Pa. A3 ..5.30
Ecorse, Mich. G5 .....5.30
Fairfield, Ala. T2 .....5.30
Farrell, Pa. S3 .....5.30
Fontana, Calif. (30) K1 ..6.10
Gary, Ind. U5 .....5.30
Geneva, Utah C11 .....5.30
GraniteCity, Ill. G4 .....5.40
Houston S5 .....5.40
Ind. Harbor, Ind. I-2, Y1..5.30
Johnstown, Pa. B2 .....5.30
Lackawanna, N.Y. B2 ..5.30
Mansfield, O. E6 .....5.30
Minnequa, Colo. C10 ....6.15
Munhall, Pa. U5 .....5.30
Newport, Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale, Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon, Pa. S3 .....5.30
S. Chicago, Ill. U5, W14..5.30
SparrowsPoint, Md. B2 ..5.30
Sterling, Ill. N15 .....5.30
Steubenville, O. W10 ....5.30
Warren, O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.

Claymont, Del. P4 .....7.05
Fontana, Calif. K1 .....7.85
Geneva, Utah C11 .....7.05
Houston S5 .....7.15
Johnstown, Pa. B2 .....7.05
SparrowsPoint, Md. B2 ..7.05

PLATES, Wrought Iron

Economy, Pa. B14 ....14.10

PLATES, H.S., L.A.

Aliquippa, Pa. J5 .....7.95
Ashland, Ky. A10 .....7.95
Bessemer, Ala. T2 .....7.95
Clairton, Pa. U5 .....7.95
Claymont, Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville, Pa. L7 .....7.95
Conshohocken, Pa. A3 ..7.95
Economy, Pa. B14 .....7.95
Ecorse, Mich. G5 .....7.95
Fairfield, Ala. T2 .....7.95
Farrell, Pa. S3 .....7.95
Fontana, Calif. (30) K1 ..8.75
Gary, Ind. U5 .....7.95
Geneva, Utah C11 .....7.95
Houston S5 .....8.05
Ind. Harbor, Ind. I-2, Y1..7.95
Johnstown, Pa. B2 .....7.95
Munhall, Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon, Pa. S3 .....7.95
S. Chicago, Ill. U5, W14..7.95
SparrowsPoint, Md. B2 ..7.95
Sterling, Ill. N15 .....7.625
Warren, O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy

Aliquippa, Pa. J5 .....7.50
Claymont, Del. P4 .....7.50
Coatesville, Pa. L7 .....7.50
Economy, Pa. B14 .....7.50
Farrell, Pa. S3 .....7.50
Fontana, Calif. K1 .....8.30
Gary, Ind. U5 .....7.50
Houston S5 .....7.60
Ind. Harbor, Ind. Y1 .....7.50
Johnston, Pa. B2 .....7.50
Lowellville, O. S3 .....7.50
Munhall, Pa. U5 .....7.50
Newport, Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon, Pa. S3 .....7.50
S. Chicago, Ill. U5, W14..7.50
SparrowsPoint, Md. B2 ..7.50
Youngstown Y1 .....7.50

FLOOR PLATES

Cleveland J5 .....6.375
Claymont, Del. P4 .....6.375
Conshohocken, Pa. A3 ..6.375
Ind. Harbor, Ind. I-2 ...6.375
Munhall, Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S. Chicago, Ill. U5 ....6.375

PLATES, Ingot Iron

Ashland c.l. (15) A10 ...5.55
Ashland l.c.l. (15) A10 ..6.05
Cleveland c.l. R2 .....6.05
Warren, O. R2 .....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala. City, Ala. (9) R2 ...5.675
Aliquippa, Pa. (9) J5 ....5.675
Alton, Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer, Ala. (9) T2 ....5.675
Birmingham(9) C15 ....5.675
Buffalo(9) R2 .....5.675
Canton, O. (23) R2 .....6.15
Clairton, Pa. (9) U5 .....5.675
Cleveland(9) R2 .....5.675
Ecorse, Mich. (9) G5 ....5.675
Emeryville, Calif. J7 ....6.425
Fairfield, Ala. (9) T2 ....5.675
Fairless, Pa. (9) U5 ....5.825
Fontana, Calif. (9) K1 ...6.375
Gary, Ind. (9) U5 .....5.675
Houston(9) S5 .....5.925
Ind. Harbor(9) I-2, Y1..5.675
Johnstown, Pa. (9) B2 ...5.675
Joliet, Ill. P2 .....5.675
KansasCity, Mo. (9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 .....6.375
Massillon, O. (23) R2 ....6.15
Midland, Pa. (23) C18 ...6.025
Milton, Pa. M18 .....5.825
Minnequa, Colo. C10 ....6.125
Niles, Calif. P1 .....6.375
Owensboro, Ky. (9) G8 ...6.025
Pittsburg, Calif. (9) C11..6.375
Pittsburgh(9) J5 .....5.675
Portland, Oreg. O4 .....6.425
Riverdale, Ill. (9) A1 ....5.675
Seattle(9) A24, B3, N15 ..6.425
S. Ch'c'go(9) R2, U5, W14 5.675
S. Duquesne, Pa. (9) U5..5.675
S. SanFran., Calif. (9) B3 6.425
Sterling, Ill. (1) (9) N15..5.675
Sterling, Ill. (9) N15 ....5.775
Struthers, O. (9) Y1 .....5.675
Tonawanda, N.Y. B12 ..5.675
Torrance, Calif. (9) C11 .6.375
Warren, O. C17 .....6.025
Youngstown(9) R2, U5..5.675

BARS, Hot-Rolled Alloy

Aliquippa, Pa. J5 ....6.725
Bethlehem, Pa. B2 ....6.725
Bridgeport, Conn. C32 ...6.80
Buffalo R2 .....6.725
Canton, O. R2, T7 ....6.725
Clairton, Pa. U5 .....6.725
Detroit S41 .....6.725
Economy, Pa. B14 .....6.725
Ecorse, Mich. G5 .....6.725
Farrell, Pa. S3 .....6.725
Fontana, Calif. K1 .....7.775
Gary, Ind. U5 .....6.725
Houston S5 .....6.975
Ind. Harbor, Ind. I-2, Y1 6.725
Johnstown, Pa. B2 ....6.725
KansasCity, Mo. S5 ....6.975
Lackawanna, N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville, O. S3 .....6.725
Massillon, O. R2 .....6.725
Midland, Pa. C18 .....6.725
Owensboro, Ky. G8 ....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon, Pa. S3 .....6.725
S. Chicago R2, U5, W14..6.725
S. Duquesne, Pa. U5 ....6.725
Struthers, O. Y1 .....6.725
Warren, O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy

Aliquippa, Pa. J5 .....8.30
Bessemer, Ala. T2 .....8.30
Bethlehem, Pa. B2 .....8.30
Clairton, Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse, Mich. G5 .....8.30
Fairfield, Ala. T2 .....8.30
Fontana, Calif. K1 .....9.00
Gary, Ind. U5 .....8.30
Houston S5 .....8.55
Ind. Harbor, Ind. Y1 .....8.30
Johnstown, Pa. B2 .....8.30
KansasCity, Mo. S5 .....8.55
Lackawanna, N.Y. B2 ..8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S. Chicago, Ill. R2, W14..8.30
S. Duquesne, Pa. U5 ....8.30
S. SanFrancisco B3 ....9.05
Sterling, Ill. N15 .....7.925
Struthers, O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon

Bethlehem, Pa. (9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity, Mo. (9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling, Ill. N15 .....5.775
Sterling, Ill. (1) N15 ...5.675
Tonawanda, N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES

Aliquippa, Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet, Ill. P22 .....5.675
Minnequa, Colo. C10 ..6.125
Niles, Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland, Oreg. O4 ....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES
Wrought Iron

Economy, Pa. B14 .....16.45

BAR SHAPES, Hot-Rolled Alloy

Aliquippa, Pa. J5 .....6.80
Clairton, Pa. U5 .....6.80
Gary, Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity, Mo. S5 ....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded (Including leaded extra) Carbon

LosAngeles P2, S30 ..11.75*

Alloy

Ambridge, Pa. W18 ...10.175
BeaverFalls, Pa. M12 ..10.175
Camden, N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria, O. W8 .....10.175
Monaca, Pa. S17 .....10.175
Newark, N.J. W18 .....10.35
SpringCity, Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon

Ambridge, Pa. W18 .....7.65
BeaverFalls, Pa. M12, R2 .7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden, N.J. P13 .....8.10
Carnegie, Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, P17 .....7.85
Detroit S41 .....7.65
Donora, Pa. A7 .....7.65
Elyria, O. W8 .....7.65
FranklinPark, Ill. N5 ....7.65
Gary, Ind. R2 .....7.65
GreenBay, Wis. F7 .....7.65
Hammond, Ind. J5, L2 ..7.65
Hartford, Conn. R2 ....8.15
Harvey, Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield, Mass. B5 ....8.20
Massillon, O. R2, R8 ....7.65
Midland, Pa. C18 .....7.65
Monaca, Pa. S17 .....7.65
Newark, N.J. W18 .....8.10
NewCastle, Pa. (17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth, Mich. P5 .....7.90
Putnam, Conn. W18 .....8.20
Readville, Mass. C14 .....8.20
Seattle(49) S30 .....9.10
S. Chicago, Ill. W14 ....7.65
SpringCity, Pa. K3 ....8.10
Struthers, O. Y1 .....7.65
Warren, O. C17 .....7.65
Waukegan, Ill. A7 .....7.65
Willimantic, Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy (Turned and Ground)

Cumberland, Md. (5) C19..6.55

BARS, Cold-Finished Alloy

Ambridge, Pa. W18 ....9.025
BeaverFalls, Pa. M12, R2 9.025
Bethlehem, Pa. B2 ....9.025
Bridgeport, Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden, N.J. P13 .....9.20
Canton, O. T7 .....9.025
Carnegie, Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.025
Detroit B5, P17 .....9.225
Detroit S41 .....9.025
Donora, Pa. A7 .....9.025
Elyria, O. W8 .....9.025
FranklinPark, Ill. N5 ...9.025
Gary, Ind. R2 .....9.025
GreenBay, Wis. F7 .....9.025
Hammond, Ind. J5, L2..9.025
Hartford, Conn. R2 ....9.325
Harvey, Ill. B5 .....9.025
Lackawanna, N.Y. B3 ...9.025
LosAngeles P2, S30 ..11.00
Mansfield, Mass. B5 ....9.325
Massillon, O. R2, R8 ..9.025
Midland, Pa. C18 .....9.025
Monaca, Pa. S17 .....9.025
Newark, N.J. W18 .....9.20
Plymouth, Mich. P5 ....9.225
S. Chicago, Ill. W14 ....9.025
SpringCity, Pa. K3 .....9.20

Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 .....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ....9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ..6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2, Y1.5.675
Johnstown,Pa. B2 .....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ..6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill. (1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ..6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5. ..7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 ....7.35
SandSprings,Okla. S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.40
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(8.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(8.R.) L5 ...14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5 .20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ....5.675
JerseyShore,Pa.(3) J8 .5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ...5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H. R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 ....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowPoint (36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 ....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irwin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

Sheets, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 ....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 ....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	5.10
Allenport,Pa. P7	5.10
Alton,Ill. L1	5.30
Ashland,Ky.(8) A10	5.10
Atlanta A11	5.10
Bessemer,Ala. T2	5.10
Birmingham C15	5.10
Conshohocken,Pa. A3	5.15
Detroit M1	5.10
Ecorse,Mich. G5	5.10
Fairfield,Ala T2	5.10
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Ind.Harbor,Ind. I-2, Y1	5.10
Johnstown,Pa.(25) B2	5.10
Lackaw'na,N.Y.(25) B2	5.10
LosAngeles(25) B3	5.85
LosAngeles C1	8.60
Minnequa,Colo. C10	6.20
Riverdale,Ill. A1	5.10
SanFrancisco S7	6.60
Seattle(25) B3	6.10
Seattle N14	6.60
Sharon,Pa. S3	5.10
S.Chicago,Ill. W14	5.10
S.SanFrancisco(25) B3	5.85
SparrowsPoint,Md. B2	5.10
Torrance,Calif. C11	5.85
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5	5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.40
Farrell,Pa. S3	8.40
Gary,Ind. U5	8.40
Houston S5	8.65
Ind.Harbor,Ind. Y1	8.40
KansasCity,Mo. S5	8.65
LosAngeles B3	9.60
Lowellville,O. S3	8.40
Newport,Ky. A2	8.40
Sharon,Pa. A2, S3	8.40
S.Chicago,Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10	7.575
Bessemer,Ala. T2	7.575
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.575
Fairfield,Ala. T2	7.575
Farrel,Pa. S3	7.575
Gary,Ind. U5	7.575
Ind.Harbor,Ind. I-2, Y1	7.575
Lackawanna,N.Y. B2	7.575
LosAngeles(25) B3	8.325
Seattle(25) B3	8.575
Sharon,Pa. S3	7.575
S.Chicago,Ill. W14	7.575
S.SanFrancisco(25) B3	8.325
SparrowsPoint,Md. B2	7.575
Warren,O. R2	7.575
Weirton,W.Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.35
Warren,O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7, J5	7.425
Dearborn,Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover,O. G6	7.425
Evanston,Ill. M22	7.525
Farrell,Pa. S3	7.425
Follansbee,W.Va. W10	7.425
Fontana,Calif. K1	9.20
FranklinPark,Ill. T6	7.525
Ind.Harbor,Ind. Y1	7.425
Indianapolis S41	7.575
Los Angeles C1, S41	9.30
McKeesport,Pa. E10	7.525
NewBedford,Mass. R10	7.875
NewBritain,Conn. S15	7.875
NewCastle,Pa. B4, M23	7.425
NewHaven,Conn. D2	7.875
NewKensington,Pa. A6	7.425
Pawtucket,R.I. R3, N8	7.975
Philadelphia P24	7.875
Pittsburgh J5	7.425
Riverdale,Ill. A1	7.525
Rome,N.Y. (32) R6	7.425
Sharon,Pa. S3	7.425
Thenton,N.J.(31) R5	8.875
Warren,O. R2, T5	7.425
Worcester,Mass. A7	7.975

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Cleveland A7	15.55
Carnegie,Pa. S18	15.55
Dover,O. G6	15.55
Farrell,Pa. S3	15.55
FranklinPark,Ill T6	15.55
Harrison,N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville,O. S3	15.55
Pawtucket,R.I. S8	15.90
Riverdale,Ill. A1	15.55
Sharon,Pa. S3	15.55
Worcester,Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn,Mich. S3	10.80
Dover,O. G6	10.80
Farrell,Pa. S3	10.80
Ind.Harbor,Ind. Y1	10.80
Sharon,Pa. S3	10.80
Warren,O. R2	10.80
Weirton,W.Va. W6	10.80
Youngstown Y1	10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3	7.50
Sharon,Pa. S3	7.50

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	....	....	18.85	22.95	27.80
Buffalo W12	....	....	18.85	....	....
Fostoria,O. S1	....	....	19.05	22.15	....
FranklinPark,Ill. T6	....	....	19.20	23.30	28.15
Harrison,N.J. C18	....	....	18.85	22.95	27.80
NewYork W3	....	....	18.85	22.95	27.80
Palmer,Mass. W12	....	....	18.85	....	....
Trenton,N.J. R5	....	....	18.85	22.95	27.80
Worcester,Mass. A7, T6	....	....	18.85	22.95	27.80
Youngstown S41	....	....	19.20	23.30	28.15

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa,Pa. J5 (21-27 Ga.)	....	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	....	7.90	....	....
Niles,O. R2 (20-27 Ga.)	....	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.20	$6.35	$6.50	$6.65
Fairless,Pa. U5	6.20	6.35	6.50	6.65
Gary,Ind. U5	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE,Hot Dipped 1.25 Common Coke	lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif.K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11.	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va.W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.30
Fairless,Pa. U5	8.30
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

STRIP, C.R., Electrogalvanized

Cleveland A7	7.425*
Dover,O. G6	7.425*
Evanston,Ill. M22	7.525*
McKeesport,Pa. E10	7.50*
NewCastle,Pa. M23	7.425*
Riverdale,Ill. A1	7.525*
Warren,O. B9, S3, T5	7.425*
Worcester,Mass. A7	7.975
Youngstown S41, Y1	7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	8.175

TIGHT COOPERAGE HOOP

Atlanta A11	5.825
Farrell,Pa. S3	5.525
Riverdale,Ill. A1	5.675
Sharon,Pa. S3	5.525
Youngstown U5	5.525

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Arma-ture	Elec-tric	Motor	Dyna-mo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed, †Fully processed only. ‡Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	8.00
Aliquippa,Pa. J5	8.00
Alton,Ill. L1	8.20
Atlanta A1	8.00
Bartonville,Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville,Ind. M8	8.10
Donora,Pa. A7	8.00
Duluth A7	8.00
Fairfield,Ala. T2	8.00
Fostoria,O.(24) S1	8.10
Houston S5	8.25
Jacksonville,Fla. M8	8.35
Johnstown,Pa. B2	8.00
Joliet,Ill. A7	8.00
KansasCity,Mo. S5	8.25
Kokomo,Ind. C16	8.10
LosAngeles B3	8.95
Minnequa,Colo. C10	8.25
Monessen,Pa. P7, P16	8.00
Palmer,Mass. W12	8.30
Pittsburg,Calif. C11	8.95
Portsmouth,O. P12	8.00
S.Chicago,Ill. R2	8.00
S.SanFrancisco C10	8.95
SparrowsPoint,Md. B2	8.10
Sterling,Ill.(1) N15	8.00
Sterling,Ill. N15	8.10
Struthers,O. Y1	8.00
Waukegan,Ill. A7	8.00
Worcester,Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria,O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa.(10) B2	12.65
KansasCity,Mo. U3	12.90
LosAngeles(2) B3	13.60
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Muncie,Ind. I-7	13.60
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	13.70
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling,N.J. R5	12.95
SparrowsPt.,Md.(10)B2	12.75
Struthers,O. Y1	13.40
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
Kokomo,Ind. C16	9.85
LosAngeles B3	10.70
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
NewHaven,Conn. A7	10.05
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Worcester,Mass. A7	10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	9.75
Alton,Ill. L1	9.95
Bartonville,Ill. K4	9.85
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Fostoria,O. S1	9.80
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
LosAngeles B3	10.70
Milbury,Mass.(12) N6	10.05
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
Muncie,Ind. I-7	9.95
Palmer,Mass. W12	10.05
Pittsburg,Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling,N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Wor'ster,Mass.A7,J4,T6	10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	16.50
Bartonville,Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville,Ind. M8	16.40
Fostoria,O. S1	16.30
Houston S5	16.55
Jacksonville,Fla. M8	16.65
Johnstown,Pa. B2	16.30
KansasCity,Mo. S5	16.55
Kokomo,Ind. C16	16.30
Minnequa,Colo. C16	16.55
Monessen,Pa. P16	16.30
Muncie,Ind. I-7	16.50
Palmer,Mass. W12	16.60
S.SanFrancisco C10	17.15
Waukegan,Ill. A7	16.30
Worcester,Mass. A7, J6	16.60

ROPE WIRE (A)

Bartonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S1	13.45
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St.Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	....17.15
Monessen,Pa. P16	....17.15
Roebling,N.J. R5	....17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	....12.35
Baltimore T6	....12.65
Boston T6	....12.65
Buffalo W12	....12.35
Chicago W13	....12.45
Cleveland A7	....12.35
Crawfordsville,Ind. M8	.12.35
Dover,O. G6	....12.35
Evanston,Ill. M22	....12.45
Farrell,Pa. S3	....12.35
Fostoria,O. S1	....12.35
FranklinPark,Ill. T6	..12.45
Kokomo,Ind. C16	....12.35
Massillon,O. R8	....12.35
Milwaukee C23	....12.55
Monessen,Pa. P7, P16	..12.35
NewCastle,Pa. M23	....12.35
Palmer,Mass. W12	....12.65
Pawtucket,R.I. N8	....12.65
Philadelphia P24	....12.65
Riverdale,Ill. A1	....12.45
Rome,N.Y. R6	....12.35
Sharon,Pa. S3	....12.35
Trenton,N.J. R5	....12.65
Warren,O. B9	....12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes — Col.

AlabamaCity,Ala. R2	...173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	..175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa P7	173
Pittsburg,Calif. C11	...192
Rankin,Pa. A7	173
S.Chicago,Ill R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	....$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10	.$10.10

POLISHED STAPLES — Col.

AlabamaCity,Ala. R2	...175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	..177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box)

Coil No. 3150

AlabamaCity,Ala. R2	..$8.78
Atlanta A11	....10.36
Bartonville,Ill. K4	....8.88
Buffalo W12	....10.26
Chicago W13	....9.24
Crawfordsville,Ind. M8	.8.88
Donora,Pa. A7	....8.78
Duluth A7	....8.78
Fairfield,Ala. T2	....8.78
Houston S5	....10.51
Jacksonville,Fla. M8	...8.88
Johnstown,Pa. B2	....8.78
Joliet,Ill. A7	....8.78
KansasCity,Mo. S5	....10.51
Kokomo,Ind. C16	....8.88
LosAngeles B3	....9.44
Minnequa,Colo. C10	....9.02
Pittsburg,Calif. C11	....9.44
S.Chicago,Ill. R2	....8.78
S.SanFrancisco C10	....9.94
SparrowsPt., Md. B2	.8.88
Sterling,Ill.(37) N15	...8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	..$9.06
Atlanta A11	....10.70
Bartonville,Ill. K4	....9.16
Buffalo W12	....10.60
Chicago W13	....9.54
Crawfordsville,Ind. M8	..9.16
Donora,Pa. A7	....9.06
Duluth A7	....9.06
Fairfield,Ala. T2	....9.06
Houston S5	....10.85
Jacksonville,Fla. M8	..9.16
Johnstown,Pa. B2	....9.06
Joliet,Ill. A7	....9.06
KansasCity,Mo. S5	....10.85
Kokomo,Ind. C16	....9.16
LosAngeles B3	....9.75
Minnequa,Colo. C10	....9.30
Pittsburg,Calif. C11	....9.75
S.Chicago,Ill. R2	....9.06
S.SanFrancisco C10	....10.26
SparrowsPt.,Md. B2	....9.16
Sterling,Ill.(37) N15	....9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	..$9.11
Atlanta A11	....10.75
Bartonville,Ill. K4	....9.21
Buffalo W12	....10.65
Chicago W13	....9.59
Crawfordsville,Ind. M8	..9.21
Donora,Pa. A7	....9.11
Duluth A7	....9.11
Fairfield,Ala. T2	....9.11
Houston S5	....10.90
Jacksonville,Fla. M8	....9.21
Johnstown,Pa. B2	....9.11
Joliet,Ill. A7	....9.11
KansasCity,Mo. S5	....10.96
Kokomo,Ind. C16	....9.21
LosAngeles B3	....9.80
Minnequa,Colo. C10	....9.35
Pittsburg,Calif. C11	....9.80
S.Chicago,Ill. R2	....9.11
S.SanFrancisco C10	....10.31
SparrowsPt.,Md. B2	....9.21
Sterling,Ill.(37) N15	....9.21

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	..214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — Col.

Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	..177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	.193**
Aliquippa,Pa. J5	....190§
Atlanta A11	....197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	..198
Donora,Pa. A7	....193†
Duluth A7	....193†
Fairfield,Ala. T2	....193†
Houston S5	....198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	....196§
Joliet,Ill. A7	....193†
KansasCity,Mo. S5	..198**
Kokomo,Ind. C16	....195†
Minnequa,Colo. C10	..198**
Monessen,Pa. P7	....196§
Pittsburg,Calif. C11	....213†
Rankin,Pa. A7	....193†
S.Chicago,Ill. R2	....193**
SparrowsPoint,Md. B2	..198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Ali'ppa,Pa. J5	..17.85	19.65
Bartonville K4	..17.95	19.80
Chicago W13	....17.85	....
Cleveland A7	....17.85	....
Craw'sville M8	17.95	19.80‡‡
Fostoria,O. S1	..18.35	19.90†
Houston S5	....18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	..17.85	19.65§
Kan.City,Mo. S5	.18.10	....
Kokomo C16	...17.95	19.50†
Minnequa C10	..18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	..17.95	19.80
SparrowsPt. B2	..17.95	19.75§
Waukegan A7	..17.85	19.40†
Worcester A7	....18.15	....

WOVEN FENCE, 9-15 Ga. — Col.

Ala.City,Ala. R2	....187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	....191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	..192
Donora,Pa. A7	....187†
Duluth A7	....187†
Fairfield,Ala. T2	....187†
Houston S5	....192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	..190§
Joliet,Ill. A7	....187†
KansasCity,Mo. S5	....192**
Kokomo,Ind. C16	....189†
Minnequa,Colo. C10	...192**
Pittsburg,Calif. C11	....210†
Rankin,Pa. A1	....187†
S.Chicago,Ill. R2	....187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality

(6 to 8 gage)	An'ld Galv.
Ala.City,Ala. R2	.9.00 9.55**
Aliquippa J5	....8.65 9.325§
Atlanta (48) A11	..9.00 9.75*
Bartonville(48)K4	9.85 19.90
Buffalo W12	....9.00 9.55†
Chicago W13	....9.00 9.55**
Cleveland A7	....9.00 ....
Crawfordsville M8	9.10 9.80††
Donora,Pa. A7	...9.00 9.55†
Duluth A7	....9.00 9.55†
Fairfield T2	....9.00 9.55†
Houston(48) S5	..9.25 9.80**
Jack'ville,Fla. M8	9.10 9.80‡‡
Johnstown(48) B2	9.00 9.675§
Joliet,Ill. A7	....9.00 9.55†
KansasCity(48)S5	9.25 9.80**
Kokomo(48) S16	.9.10 9.65†
LosAngeles B3	..9.95 10.625§
Minnequa C10	..9.25 9.80**
Monessen(48) P7	.8.65 9.35§
Palmer,Mass. W12	.9.30 9.85†
Pitts.,Calif. C11	..9.95 10.50†
Rankin,Pa. A7	...9.00 9.55†
S.Chicago R2	....9.00 9.55**
S.SanFran. C10	.9.95 10.50**
Spar'wsPt.(48)B2	9.10 9.775§
St'ling(37)(48)N15	.9.10 9.80
Struthers,O. Y1	...9.00 9.65‡
Worcester,Mass.A7	9.30 9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85
7/16 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws: ¾ in. and smaller, 6 in. and shorter:

Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread: Through 1 in. diam., 6 in. and shorter:

Packaged	+ 5
Bulk	19

Through 1 in. diam., longer than 6 in.:

Packaged	+29

HEXAGON NUTS: American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....(16)	6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	.....6.875
Gary,Ind. U5	.....6.875
Lackawanna,N.Y. B2	..6.875
Minnequa,Colo. C10	...6.875
Seattle B3	.....7.025
Steelton,Pa. B2	.....6.875
Torrance,Calif. C11	...7.025

JOINT BARS

Bessemer,Pa. U5	.....7.25
Fairfield,Ala. T2	.....7.25
Joliet,Ill. U5	.....7.25
Lackawanna,N.Y. B2	..7.25
Minnequa,Colo. C10	....7.25
Steelton,Pa. B2	.....7.25

AXLES

Ind.Harbor,Ind. S13	..9.125
Johnstown,Pa. B2	....9.125

SCREW SPIKES

Lebanon,Pa. B2	.....15.10

TRACK BOLTS, Untreated

Cleveland R2	.....15.35
KansasCity,Mo. S5	....15.35
Lebanon,Pa. B2	.....15.35
Minnequa,Colo. C10	....15.35
Pittsburgh S44	.....15.35
Seattle B3	.....15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	.....10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	....10.10
Lebanon,Pa. B2	.....10.10
Minnequa,Colo. C10	....10.10
Pittsburgh J5	.....10.10
Seattle B3	.....10.60
S.Chicago,Ill. R2	.....10.10
Struthers,O. Y1	.....10.10
Youngstown R2	.....10.10

Footnotes

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S1	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	B'k	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 12.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.00	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	31.75	41.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	61.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y., R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malleable	Bessemer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
Port Colborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry. K2	89.00
Keokuk, Iowa O.H. & Fdry. 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	7.77	9.61	10.06	....	10.18	8.55	11.70	16.38	9.03	8.34	10.02
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.55	9.30	11.25	55.98	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	9.87	11.22	10.30	....	10.86	9.67	12.68	....	9.88	9.82	11.46
Chicago	8.57	10.20	10.15	52.00	10.74	8.55	10.65	15.95	8.91	8.41	10.68
Cincinnati	9.34	10.26	10.75	65.30	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	8.57	9.98	10.92	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.05	11.75	....	10.57	9.03	12.98	16.95	9.26	9.35	11.97
Detroit	9.48	10.46	11.05	52.00	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	9.65	11.35	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.60
Indianapolis	9.66	10.64	11.14	....	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	9.50	11.20	12.20	61.27	11.20	9.55	14.20	17.35	10.45	9.70	11.70
Memphis, Tenn.	8.98	10.05	....	....	10.64	8.82	12.74	....	9.01	8.66	11.41
Milwaukee	8.71	10.34	10.29	....	10.88	8.69	10.89	16.09	9.13	8.55	10.82
Moline, Ill.	8.92	10.55	10.50	....	11.09	8.90	11.00	16.30	9.26	8.76	11.03
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.00
Philadelphia	8.35	9.60	10.66	52.71	10.35	8.75	11.95	16.38	8.95	8.70	9.95
Pittsburgh	8.57	9.98	11.13	52.00	10.84	8.55	11.25	15.95	8.91	8.41	10.68
Portland, Oreg.	9.45	11.30	12.35	....	11.45	9.45	16.65	17.80	10.05	9.60	11.75
St. Louis	8.77	10.53	11.08	....	10.94	8.77	11.28	16.33	9.14	8.77	10.91
St. Paul	9.57	10.24	11.39	....	11.74	9.57	11.49	16.54	9.92	9.41	10.95
San Francisco	10.17	11.69	11.40	54.00	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.51	11.57	12.50	54.02	11.95	9.94	16.20	17.80	10.65	10.10	12.73
Spokane, Wash.	10.36	11.42	12.35	54.02	11.80	9.79	16.20	17.85	10.50	9.95	12.58

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. & 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅝ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Lump ⅛ in. and up	12.85
Fines, under ⅛ in.	10.72
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian, 68.5% f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.00-19.50*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75
48% no ratio	24.00-28.00†

Turkish

48% 3:1	35.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.70-3.20
60-65%	3.25-3.45

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30
Structural Shapes:	
Standard carbon	5.50
Angles & zees	5.40
Plates, Carbon:	
Sheared	5.45
Universal mill	5.10
Sheets & Coils, Hot Rolled:	
Carbon sheet	4.95
Carbon strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon sheet	6.35
Carbon strip:	
(0.080 and lighter)	6.35
(0.081 and heavier)	6.65
Sheets & Coils, Galvanized:	
Standard quality	6.70
Culvert quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field grade	9.00
Armature grade	9.50
Electrical grade	10.15
Sheet Piling	6.15
Skelp	4.70
Rails, Heavy	5.55
Rails, Light	5.70
Joint Bars	6.55
Tie Plates	6.35
Grinding Balls (3 in. diam.)	7.00
Tin Mill Products	(Per base box; 100 lb base wt)
Coke tin plate (1.25 lb pot yield)	$10.60
Electrolytic tin plate (0.25 lb coating)	9.10
Black plate	8.30
Nails, Wholesale:	
Carload lots	Col. 110

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. truckiots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‖
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe	36.75, ton, del. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	53.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	36.50
Bronze powder, 90/10	54.20
Copper, all types	15.25*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types	0.78-1.06
Nickel-Silver	57.90
Solder	7.50*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	23.20

Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten	nom.
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.65	$5.90	$5.60	$5.50	$5.80
Bar Size Angles	5.85	6.10	5.80	5.70	6.00
Structural Angles	5.65	5.90	5.60	5.50	5.80
I-Beams	5.60	5.85	5.55	5.45	5.75
Channels	5.60	5.85	5.55	5.45	5.75
Plates (basic bessemer)	5.45	5.80	5.50	5.40	5.70
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.20	24.70	24.40	24.40	25.20
Barbed Wire (†)	6.50	6.40	6.40	6.25	6.60
Merchant Bars	5.85	6.10	5.80	5.70	6.00
Hot-Rolled Bands	5.95	6.20	5.90	5.80	6.10
Wire Rods, Thomas Commercial No. 5	5.80	5.85	5.75	5.75	6.00
Wire Rods, O.H., No. 5	6.00	6.05	5.95	5.95	6.25
Bright Common Wire Nails (‡)	6.55	6.80	6.50	6.40	6.70

†Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5-7%, Si 4-6%, S 0.03% max., 20.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Bleeking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max., Si 1.0% max., S 0.03%, 21.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Low-Carbon Ferrochrome (Simplex) Cr 63-66% or 68-71%: C 0.025% max., 31.50c; C 0.010% max., 32.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Cr 68-73%: C 0.25% max., 33.00c. Cr 65-71%: C 0.06% max., 32.00c; C 0.10% max, 31.75c; C 0.20% max, 31.50c; C 0.50% max, 31.25c; C 1.0% max, 31.00c; C 1.5%, 30.75c; C 2.0% max, 30.50c, carlots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%), C.l., 2" x D, bulk 30.5c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy, carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 22.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 22.50c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ¼" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon, Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca), C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETED ALLOYS

Chromium Briquets: (Weighing approx 3¾ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). $5.25 per lb (all quantities) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-77% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorous: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

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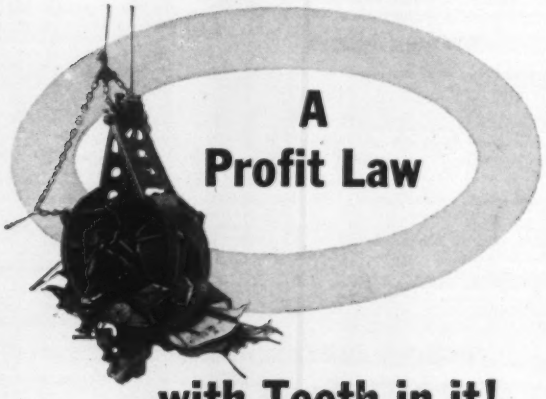

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Smaller Tonnage of Tin Cans Was Shipped in 1960

The movement of tin plate cans in December, 1960, totaled 345,782 tons, up 317,937 from November and 316,921 from December, 1959, reports the Census Bureau. Total shipments for all of 1960 were 4,801,096 tons, down somewhat from the 4,948,955 tons moved in 1959.

Shipments of fruit and fruit juice cans amounted to 45,839 tons in December vs. 41,759 in November. The movement of vegetable and vegetable juice cans was 32,614 tons in December. The total for both categories was 67,788 tons.

Shipments of fruit and fruit juice cans in all of 1960 totaled 727,949 tons, vegetable and vegetable juice cans 805,319 tons—a combined total of 1,533,268 tons. That compares with 1,563,984 in all of 1959.

Beer can shipments in December amounted to 71,811 tons, up sharply from the 54,070 tons moved in November. Shipments for all of 1960 were 862,253 tons, down from the 901,127 tons moved in 1959.

Aluminum can shipments in December amounted to 1800 tons vs. 1572 in the preceding month. The total for all of 1960 was 19,647 tons.

Sheet & Tube Denies Part In Belgian Steel Project

Youngstown Sheet & Tube Co., Youngstown, mentioned in connection with a group planning a fully integrated steel plant in Belgium, is not associated with the group, A. S. Glossbrenner, president, said last week.

He said that while Youngstown has a continuing interest in foreign steel developments, his company is not participating in this or any similar European steel plant project at this time.

A group of European Common Market steelmakers plans to build a plant having 1,250,000 to 2 million tons annual capacity on the Ghent Canal in Belgium to make it easier to import material and ship in international markets.

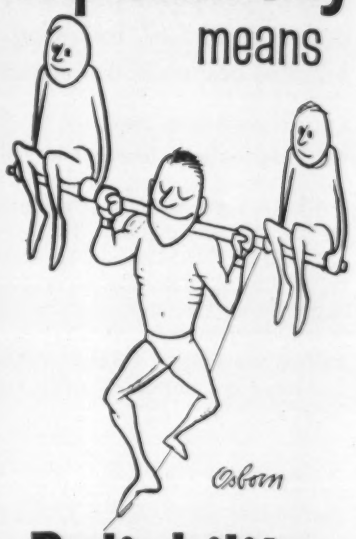
Steel Shipments by Markets—December, 1960

(All grades; net tons)

Markets	December 1960	December 1959	Total for Year 1960	Total for Year 1959
Converting, etc.	174,201	432,983	2,893,109	3,118,537
Forgings (except auto)	50,207	125,119	839,649	955,707
Fasteners	66,787	146,332	1,071,468	1,086,889
Warehouses:				
Oil & gas	85,838	173,468	1,124,348	1,880,219
All other	596,293	1,422,463	11,369,129	11,159,336
Total warehouse	682,131	1,595,931	12,493,477	13,039,555
Construction:				
Railroad	2,036	3,277	50,818	39,715
Oil & gas	118,719	213,612	2,147,958	2,259,745
All other	467,891	781,489	7,481,843	6,216,892
Total construction	588,646	998,378	9,680,619	8,516,352
Contractors' products	191,902	424,614	3,603,854	3,574,802
Automotive:				
Cars, trucks, etc.	879,366	1,748,099	14,199,713	13,781,870
Forgings	21,405	47,630	416,953	425,056
Total automotive	900,771	1,795,729	14,616,666	14,206,926
Rail transportation:				
Rails, etc.	20,817	70,283	718,376	763,309
Cars, locomotives	83,087	202,108	1,762,952	1,571,875
Transit systems	3,637	2,840	38,928	21,663
Total railroad	107,541	275,231	2,520,256	2,356,847
Shipbuilding	40,665	74,496	622,360	645,805
Aircraft	5,140	10,468	76,896	71,572
Oil & gas drilling	17,222	60,906	404,275	540,382
Mining, quarrying, etc.	14,753	34,828	287,931	234,684
Agricultural:				
Machinery	62,399	113,755	764,485	965,516
All other	14,555	31,392	238,148	300,564
Total agricultural	76,954	145,147	1,002,633	1,266,080
Machinery, etc.	214,091	482,599	3,956,799	4,158,903
Elec. machinery	130,975	248,469	2,081,600	2,051,383
Appliances, etc.	109,718	203,994	1,763,387	1,829,531
Other equipment	111,065	218,309	1,953,117	1,840,091
Containers:				
Cans & closures	228,220	464,526	4,977,459	5,010,558
Barrels, drums, etc.	56,480	97,267	839,703	772,571
All other	32,422	71,077	610,961	534,679
Total containers	317,122	632,870	6,428,123	6,317,808
Ordnance, military	15,019	16,642	160,804	127,427
Nonclassified	142,414	169,543	2,116,473	2,029,167
Total Domestic Shipments	3,957,324	8,092,588	68,573,496	67,968,448
Exports	158,723	118,459	2,575,722	1,408,619
Total Shipments	4,116,047	8,211,047	71,149,218	69,377,067

Data from American Iron & Steel Institute.

Capacability means



Reliability

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Scrap Index Highest in Over a Year

STEEL's composite price on No. 1 heavy melting jumps $1.67 a ton to $35.67 following sharp rise in bids on industrial bundles and railroad material. Exports providing support

Scrap Prices, Page 114

• **Chicago**—Open hearth and railroad grades of scrap are up $1 to $2 a ton as an aftermath of a $5 advance on No. 1 factory bundles. The winning bid of $37.51 a ton on track for 8900 tons of bundles to be produced by an auto stamping plant in March figures out at $41.21, delivered, when freight of $2.70 and $1 brokerage are added. The material is believed destined for export.

No. 1 railroad heavy melting steel is up about $2.50 a ton (to $36.50, delivered, without brokerage) in successful bids on a railroad list.

Those influences, combined with limited mill purchases, give support to the $1 and $2 increases in other railroad grades and open hearth material. There is some indication that the mills will resist rising scrap prices by increased use of blast furnace hot metal. Active furnaces now total 22 out of 43 in the district, a gain of three within the last two weeks.

• **Pittsburgh**—Scrap prices are higher across the board in a market strengthened by export demand and reduced generation of industrial grades. Brokers' bids on March production of No. 1 factory bundles from the local plant of GM's Fisher Body Div. were up $5 a ton. Brokers from a mill on the edge of the district upped their buying price on No. 1 heavy melting by $3 a ton. A specialty steelmaker, back in the market for the first time in nine month, paid $26 a ton for special, alloy free turnings.

• **Philadelphia**—Despite moderating weather, which should soon ease the flow of merchant grades of scrap, the market continues fairly strong. That's especially true of manufacturers' scrap, production of which has been limited for some time.

Domestic prices on No. 1 bundles and No. 1 busheling have advanced $1 a ton to $41, delivered, and similarly, on electric furnace bundles to $42. There has also been an advance in railroad specialties to $44-$45. All other grades are unchanged.

Japan is expected to conclude negotiations shortly on purchases of scrap from this country for shipment in the second quarter.

• **New York** — Brokers' buying prices on the major grades of scrap are unchanged, pending clarification of Japan's needs. Negotiations are in progress. In the specialties, 18-8 sheets, clips, and solids have advanced again, rising another $5 a ton to $155-$160.

• **Detroit**—Prices are up sharply on auto lists that closed last week. The increase reflects a 25 per cent

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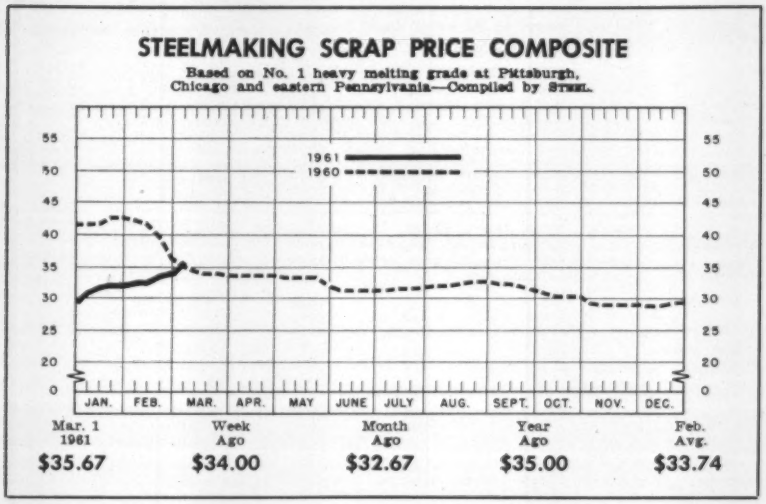

reduction in the number of cars of scrap offered in Chrysler lists. That company had advertised a minimum of 269 cars of No. 1 bundles and busheling. For March, it advertised a minimum of 194 cars.

● **Cleveland**—Prices are up $4 to $5 a ton on the major steelmaking grades of scrap, reflecting a sharp advance in bids for No. 1 automotive bundles at the end of last month, now quoted at $40-$41 delivered. A slight pickup in steelmaking operations is stimulating expectations of a rise in demand shortly, particularly from Valley mills. Dealers now are quoting No. 1 heavy melting at $33-$34 in Cleveland and $36-$37 in Youngstown. The foundry grades are also up about $2 a ton, while prices on stainless scrap advanced $5.

● **Buffalo**—The mills are showing little interest in scrap offerings, chiefly because they are operating on curtailed schedules. One large consumer remains out of the market except for blast furnace material. Another mill is holding up shipments on a secondary grade of scrap, while a third mill is taking in limited tonnages of No. 1 material. The outlook for March is not too promising, but there's a strong export demand that's pulling scrap away from this area. This provides a measure of support for prices.

● **Cincinnati**—The market appears to be stronger, but prices are unchanged. There's a possibility that prices will rise $2 a ton shortly, dealers say. Prices on some items recently advanced $1 a ton on expectations of the early resumption of buying by area mills.

● **St. Louis**—Most of the interest in scrap being shown here is for tonnage to be shipped outside the immediate district, mainly by barge and rail to New Orleans for export. The activity is serving to push local prices upward; area steelmakers are paying more for No. 2 bundles, No. 2 heavy melting, and 2 ft foundry steel. Buying on domestic account is also showing signs of picking up.

● **Birmingham**—Weakness is reported in the cast iron grades. No. 1 cupola, stove plate, and unstripped motor blocks are down $1 a ton, and one dealer says the drop was as much as $2. The decline was attributed to continued curtailment of pipe shop and general foundry activity. Another reason given, is the acquisition of an Alabama pipe manufacturing facility by a producer of merchant pig iron. In the steel grades, No. 1 bundles are off $1 a ton.

● **Houston**—The scrap market in the Gulf Coast area continues quiet. However, trading is a little more active than it was in January. A mild pickup in demand during early February provided an optimistic note. Prices are unchanged.

● **Seattle**—Unfavorable weather recently slowed scrap shipments from the interior, and dealers' supplies are not excessive. Mill buying is sporadic, but exporters are stockpiling for early offshore shipments. Some price changes are expected shortly.

● **Los Angeles**—Dealers are worried over their market position. With only export tonnage moving (to Japan), they are apprehensive that the bottom will drop out of the market if Japanese demand weakens.

● **San Francisco**—Japan is not cutting back on its steel scrap purchases in this country despite its foreign trade deficit—estimated at $99 million for January. The Japanese government blames the imbalance on several factors, including the recession in the U. S., seasonal factors, and increased imports of raw materials for making steel and textiles.

Farm Equipment Builders Report Improved Outlook

Manufacturers of farm machinery and industrial equipment are reporting a more favorable business outlook for the first quarter.

R. S. Stevenson, president, Allis-

(*Please turn to Page* 119)

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Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Mar. 1, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Mar. 1	$35.67
Mar. 22	34.00
Feb. Avg.	33.74
Mar. 1960	34.00
Mar. 1956	50.21

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*34.00-35.00*
No. 2 heavy melting	*30.00-31.00*
No. 1 dealer bundles	*34.00-35.00*
No. 2 bundles	*28.00-29.00*
No. 1 busheling	*34.00-35.00*
No. 1 factory bundles	*44.00-45.00*
Machine shop turnings	*16.00-17.00*
Mixed borings, turnings	*16.00-17.00*
Short turnings	*20.00-21.00*
Cast iron borings	*19.00-20.00*
Cut structurals:	
2 ft and under	*36.00-37.00*
3 ft and under	*35.00-36.00*
Heavy turnings	*27.00-28.00*
Punchings & plate scrap	*40.00-41.00*
Electric furnace bundles	*40.00-45.00*

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	32.00-33.00
Stove plate	29.00-30.00
Unstripped motor blocks	24.00-25.00
Clean auto cast	31.00-32.00
Drop broken machinery	44.00-45.00‡

Railroad Scrap

No. 1 R.R. heavy melt.	35.00-36.00
Rails, 2 ft and under	48.00-49.00
Rails, 18 in. and under	49.00-50.00
Random rails	44.00-45.00
Angles, splice bars	40.00-41.00
Railroad specialties	44.00-45.00
Rails, rerolling	53.00-54.00

Stainless Steel Scrap

18-8 bundles & solids	*180.00-185.00*
18-8 turnings	*105.00-110.00*
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	*34.00-35.00*
No. 1 hvy melt., dealer	*32.00-33.00*
No. 2 hvy melting	*29.00-30.00*
No. 1 factory bundles	*40.00-41.00*
No. 1 dealer bundles	*33.00-34.00*
No. 2 bundles	*21.00-22.00*
No. 1 busheling, indus.	*34.00-35.00*
No. 1 busheling, dealer	*32.00-33.00*
Machine shop turnings	*15.00-16.00*
Mixed borings, turnings	*17.00-18.00*
Shovel turnings	*17.00-18.00*
Cast iron borings	*17.00-18.00*
Cut structurals, 3 ft	*38.00-39.00*
Punchings & plate scrap	*39.00-40.00*

Cast Iron Grades

No. 1 cupola	*42.00-43.00*
Stove plate	*38.00-39.00*
Unstripped motor blocks	*34.00-35.00*
Clean auto cast	*47.00-48.00*
Drop broken machinery	*47.00-48.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*36.50-37.50*
R.R. malleable	*44.00-45.00*
Rails, 2 ft and under	*49.00-50.00*
Rails, 18 in. and under	*50.00-51.00*
Angles, splice bars	*42.00-43.00*
Axles	*56.00-57.00*
Rails, rerolling	*56.00-57.00*

Stainless Steel Scrap

18-8 bundles, solids	165.00-175.00
18-8 turnings	95.00-100.00
430 bundles & solids	85.00-90.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*26.00-27.00*
No. 2 heavy melting	*21.00-22.00*
No. 1 bundles	*29.00-30.00*
No. 2 bundles	*19.00-20.00*
No. 1 busheling	*26.00-27.00*
Machine shop turnings	*10.00-11.00*
Mixed borings, turnings	*11.00-12.00*
Shovel turnings	*12.00-13.00*

Cast Iron Grades

No. 1 cupola	*31.00-32.00*
Stove plate	*25.00-26.00*
Heavy breakable	*24.00-25.00*
Unstripped motor blocks	*21.00-22.00*
Charging box cast	*26.00-27.00*
Clean auto cast	*37.00-38.00*

CLEVELAND

No. 1 heavy melting	*33.00-34.00*
No. 2 heavy melting	*21.00-22.00*
No. 1 factory bunndles	*40.00-41.00*
No. 1 bundles	*34.00-35.00*
No. 2 bundles	*19.00-20.00*
No. 1 busheling	*34.00-35.00*
Machine shop turnings	*12.00-13.00*
Shovel turnings	*16.00-17.00*
Mixed borings, turnings	*16.00-17.00*
Cast iron borings	*16.00-17.00*
Cut foundry steel	*33.00-34.00*
Cut structurals, plate, 2 ft and under	*40.00-41.00*
Low phos. punchings & plate	*35.00-36.00*
Alloy free, short shovel turnings	*18.00-19.00*
Electric furnace bundles	*36.00-37.00*

Cast Iron Grades

No. 1 cupola	*39.00-40.00*
Charging box cast	*26.00-27.00*
Heavy breakable cast	*28.00-29.00*
Stove plate	*36.00-37.00*
Unstripped motor blocks	*31.00-32.00*
Brake shoes	*37.00-38.00*
Clean auto cast	*45.00-46.00*
Burnt cast	*32.00-33.00*
Drop broken machinery	*46.00-47.00*

Railroad Scrap

R.R. malleable	*45.00-46.00*
Rails, 2 ft and under	*52.00-53.00*
Rails, 18 in. and under	*52.00-53.00*
Rails, random lengths	*44.00-45.00*
Cast steel	*42.00-43.00*
No. 1 railroad cast	*48.00-49.00*
Railroad specialties	*45.50-46.50*
Angles, splice bars	*43.50-44.50*
Rails, rerolling	*56.00-57.00*

Stainless Steel Scrap
(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	*155.00-160.00*
18-8 turnings	*70.00-75.00*
430 clips, bundles, solids	*70.00-75.00*
430 turnings	*15.00-25.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*38.00-39.00*

BUFFALO

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	27.00-28.00
No. 2 bundles	20.00-21.00
No. 1 busheling	27.00-28.00
Shovel turnings	16.00-17.00
Machine shop turnings.	12.00-13.00
Cast iron borings	14.00-15.00
Low phos. structurals and plates, 2 ft and under	37.00-38.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	36.00-37.00
No. 1 machinery	43.00-44.00

Railroad Scrap

Rails, random lengths	40.00-41.00
Rails, 3 ft and under	46.00-47.00
Rails, rerolling	56.50-57.50
Railroad specialties	39.00-40.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*29.50-30.50*
No. 2 heavy melting	*27.00-28.00*
No. 1 bundles	*30.50-31.50*
No. 2 bundles	*21.00-22.00*
No. 1 busheling	27.50-28.50
Machine shop turnings.	10.00-11.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	11.00-12.00
Cast iron borings	11.00-12.00
Low phos. 18 in.	*36.00-37.00*

Cast Iron Grades

No. 1 cupola	36.00-37.00
Heavy breakable cast.	28.00-29.00
Charging box cast	35.00-36.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	31.00-32.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths.	38.00-39.00

PHILADELPHIA

No. 1 heavy melting	39.00
No. 2 heavy melting	36.00
No. 1 bundles	*41.00*
No. 2 bundles	26.00
No. 1 busheling	*41.00*
Electric furnace bundles	*42.00*
Mixed borings, turnings	15.00
Shovel turnings	21.00
Machine shop turnings.	14.00
Heavy turnings	25.00†
Structurals & plates	41.00-43.00
Couplers, springs, wheels	*44.00-45.00*
Rail crops, 2 ft & under	50.00-52.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	39.00
Drop broken machinery	49.00-50.00
Malleable	46.00†

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	20.00-21.00
No. 1 bundles	28.00-29.00
No. 2 bundles	17.00-18.00
Machine shop turnings.	3.50-4.00†
Mixed borings, turnings	4.00-4.50†
Shovel turnings	5.00-6.00†
Low phos. structurals & plates	31.00-32.00†

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	23.00-24.00
Heavy breakable	28.00-29.00

Stainless Steel

18-8 sheets, clips, solids	*155.00-160.00*
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 1 busheling	23.00-24.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	30.00-30.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	*32.00-33.00*
No. 2 bundles	20.00-21.00
No. 1 busheling	32.00-33.00
Cast iron borings	10.00-11.00
Machine shop turnings.	15.00-16.00
Shovel turnings	18.00-19.00
Bar crops and plate	37.00-38.00
Structurals & plate	36.00-37.00
Electric furnace bundles	34.00-35.00
Electric furnace:	
3 ft and under	34.00-35.00
2 ft and under	35.00-36.00

Cast Iron Grades

No. 1 cupola	*44.00-45.00*
Stove plate	*44.00-45.00*
Unstripped motor blocks	*32.00-33.00*
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	37.00-38.00
Angles, splice bars	37.00-38.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	30.00
No. 2 heavy melting	*26.00*
No. 1 bundles	30.00
No. 2 bundles	*22.00*
No. 1 busheling	28.00
Machine shop turnings	*10.00*
Shovel turnings	*12.00*

Cast Iron Grades

No. 1 cupola	40.00
Charging box cast	33.00
Heavy breakable cast	31.00
Unstripped motor blocks	33.00
Clean auto cast	41.00
Stove plate	35.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00
Rails, random lengths	37.00†
Rails, rerolling	49.00†
Rails, 18 in. and under	40.00†
Angles, splice bars	40.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	35.00-36.00†
No. 2 heavy melting	31.00
No. 1 bundles	35.00-36.00
No. 2 bundles	21.00-22.00
Machine shop turnings.	7.00-8.00†
Low phos. plate & structurals:	
3 ft	36.00-37.00
2 ft and under	39.00-40.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Heavy breakable	24.00
Foundry malleable	29.00-30.00†
Unstripped motor blocks	30.00-31.00

Railroad Scrap

R.R. heavy melt. (3 ft)	36.00-37.00

LOS ANGELES

No. 1 heavy melting	30.00
No. 1 hvy melt (export)	34.00*
No. 2 heavy melting	*27.00*
No. 2 hvy melt (export)	30.00*
No. 1 bundles	25.00
No. 2 bundles	*17.00*
No. 2 bundles (export)	22.00*
Machine shop turnings.	12.00
Shovel turnings	*13.00*
Cast iron borings	*13.00*
Cut structurals and plate 1 ft and under	40.00

Cast Iron Grades

No. 1 cupola	*44.00*

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-36.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	35.00-36.00
No. 2 bundles	22.00-23.00
Shovel turnings	13.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	39.00
Heavy breakable	36.00-37.00
Unstripped motor blocks	33.00
Stove plate (f.o.b. plant)	35.00-36.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	38.00-39.00
No. 1 hvy (unprepared)	33.00-35.00
No. 2 heavy melting	35.00-36.00
No. 2 hvy (unprepared	31.00-33.00
No. 2 bundles	22.00-23.00
Shovel turnings	15.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	39.00
Heavy breakable cast	36.00-37.00
Unstripped motor blocks	31.00-33.00
Stove plate (f.o.b. plant)	35.00-36.00

SAN FRANCISCO

No. 1 heavy melting	32.00
No. 2 heavy melting	29.00
No. 1 bundles	27.00-28.00
No. 2 bundles	18.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	46.00-48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

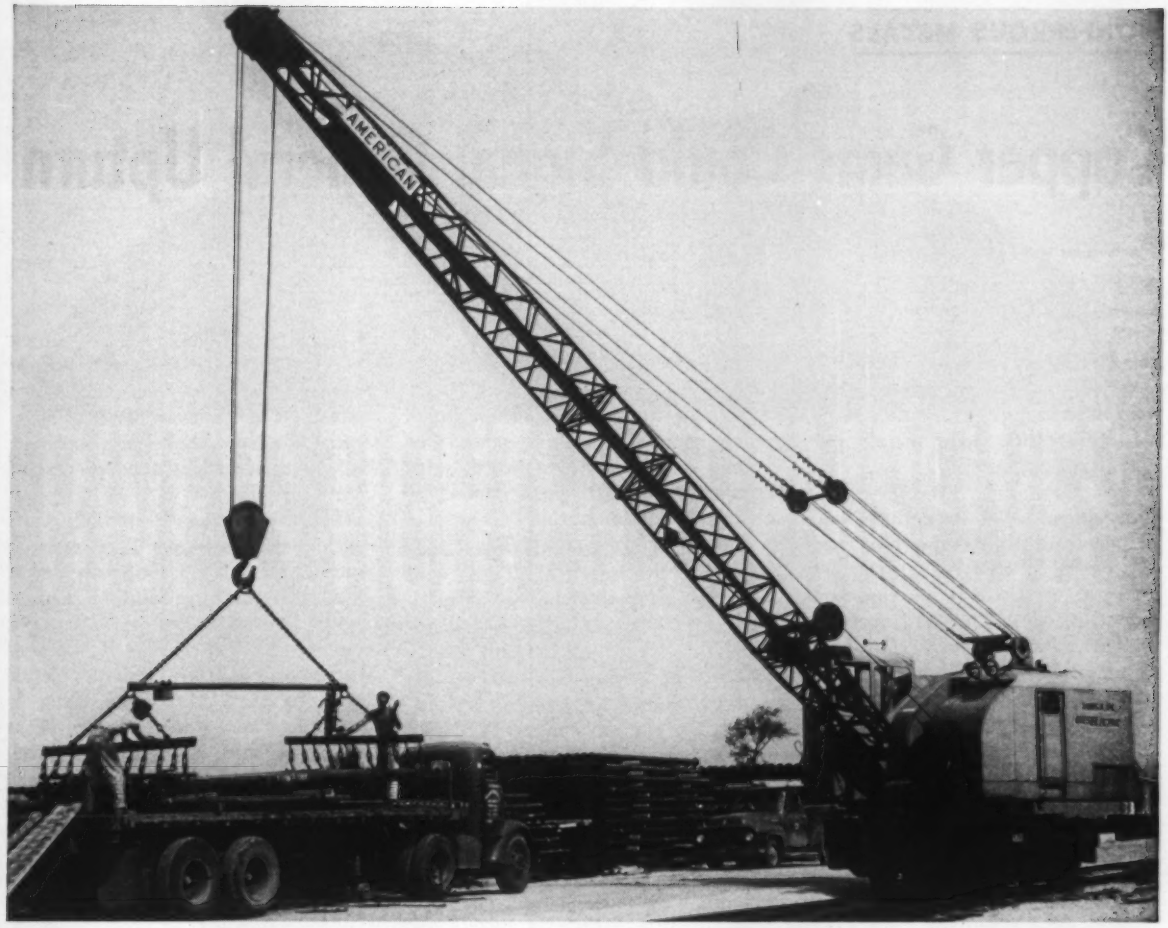
(Brokers' buying prices; net tons)

No. 1 heavy melting	*28.00*
No. 2 hvy melt, 2 ft & under	*27.00*
No. 1 bundles	*28.00*
No. 2 bundles	*17.50*
Mixed steel scrap	*20.00*
Mixed borings, turnings	12.00
Busheling, new factory: Prepared	*28.00*
Unprepared	*22.00*
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	*32.00*

*For export add $4 dock charge.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.



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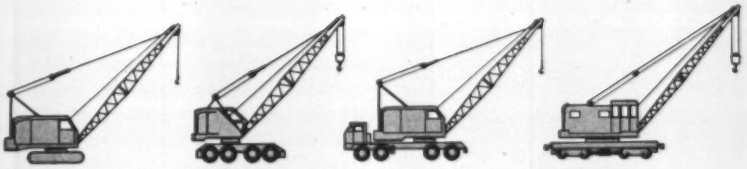

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Copper Gains Could Signal General Upturn

Nonferrous Metal Prices, Pages 118 & 119

A BREAK in the recession or a mild seasonal upturn?

That's the question posed by a gain in copper sales over the past few weeks. There are also scattered reports of some improvement in demand for other major metals, particularly aluminum.

• **Significance**—If strength in copper sales continues over the next few weeks, it may be a pretty fair indicator of the direction the economy is taking, since the metal is used by a broad cross section of industry. Too, copper has suffered from the same ills that have afflicted so many other segments of metalworking—overcapacity, excess production, large consumer stocks.

• **Behind the Upturn**—The upturn in copper encompasses several factors: Political turmoil in Africa has firmed the world market. Even though the Congo's copper-rich Katanga province has been spared the worst of civil disorder, chaotic conditions could erupt there at any time. In Northern Rhodesia's famed copper belt, the richest copper properties in the world are operated under the constant threat of a sudden, violent flareup.

The uncertainty has naturally affected the sensitive pulse of the London Metal Exchange. And what affects the LME also affects the U. S. market. The LME copper price had shot up to more than 28.5 cents a pound as STEEL went to press. If you add in the 1.7 cents a pound duty on imported metal, plus about 0.8 cent a pound for ocean freight and insurance, shipping of foreign copper to the U. S. becomes uneconomical.

The upshot has been that dealers can't undersell producers and custom smelters (who are quoting 29 cents a pound). So, many consumers who had been buying foreign copper have turned to domestic sources of supply. It's difficult for copper companies to pinpoint how much of the added sales are to those people and how much is for increased consumption.

The African situation has also strengthened good demand from abroad for U. S. copper.

Those factors don't wholly explain better copper sales. It's obvious some U. S. consumers are buying more. The question is why are they buying? Some inventory replenishment seems to be underway, particularly by those firms that pared stocks too far. A number of purchasing agents in a recent STEEL survey (Feb. 6, p. 120) indicated they were building up copper stocks. Even so, there also appears to be more buying for immediate consumption.

• **Fabricators Doing Better**—Brass mills, the copper industry's biggest market, report a recent business pickup. The industry, because of its wide diversity of customers, has been a traditional bellwether of metalworking sales.

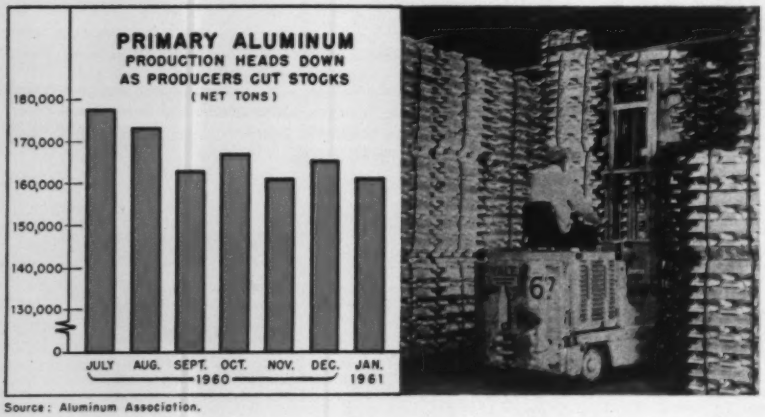
Spokesmen aren't predicting an end to the recession. They say the pickup is still too spotty to determine whether it's solid or temporary. For example, one company reports an across-the-board improvement. Another says sales are better only in the West. One thing is certain: There's more optimism at both the mill and customer level.

• **Prices Firmer**—There are some signs of price strengthening in the copper market. While brass mill prices remain "chaotic" (in the words of one mill executive) an Eastern brass and bronze ingot maker raised its prices 1 to 2 cents a pound last week. And the price of producer and custom smelter copper is definitely firmer.

Copper scrap prices are up. Exports have been heavy, particularly to Japan. Less scrap has been generated because of lower industrial activity. Higher scrap prices, combining with the present political-economic factors, could stimulate a higher custom smelter price in the weeks ahead.

Keep this in mind on the primary price: Labor contracts expire at Kennecott Copper Corp.'s U. S. facilities in June and July. A strike here, combined with the uncertainties in Africa, would almost surely bring a price rise. So would a major disruption at African mines.

Copper is still in oversupply. But its statistical position should begin to improve in a few more weeks as cutbacks already in effect are felt. It wouldn't take too much of a production disruption anywhere in the Free World to put supply and demand nearly in balance.



Source: Aluminum Association.

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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.50-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.60 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.

Copper: Electrolytic, 29.00 deld.; custom smelters, 29.00; lake, 29.00 deld.; fire refined, 28.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinstic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-90 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, N. York, $206-208 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "P" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. Ports of entry, contained nickel 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l. 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50-5 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot, 101.75; prompt, 101.625.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75-2.85 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.10-4.00.

Zinc: Prime western, 11.50; brass special, 11.75; intermediate, 12.00, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.85; special high grade, 13.00 deld. Die casting alloy ingot No. 3, 14.25; No. 2, 14.75; No. 5, 14.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb; 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 25.00-26.00; No. 12 foundry alloy (No. 2 grade), 22.75; 5% silicon alloy, 0.60 Cu max., 24.00; 13 alloy, 0.60 Cu max., 24.00; 195 alloy, 25.75; 108 alloy, 23.25. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.75; grade 2, 22.50; grade 3, 21.50; grade 4, 21.00.

Brass Ingot: Red brass, No. 115, 27.25-28.25; tin bronze, No. 225, 37.00-38.00; No. 245, 31.50-32.50; high leaded tin bronze, No. 305, 31.75-32.75; No. 1 yellow, No. 405, 22.75-24.75; manganese bronze, No. 421, 26.50-27.50.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.935, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.935, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 34.355; l.c.l., 34.98. Weatherproof, 20,000-lb lots, 35.55; l.c.l., 36.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; length, 72-240 in., mill finish.

Alloy	Plates Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No 1 heavy copper and wire, 22.00-22.50; No. 2 heavy copper and wire, 20.75-21.25; light copper, 18.25-18.75; No. 1 composition red brass, 18.25-18.75; No. 1

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 29.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	54.13b	51.36c	....	55.32	25.000	25.000	24.250
Yellow Brass	48.10	33.71d	48.39	52.26	19.250	18.375	17.375
Low Brass, 80%	50.65	50.39	50.94	54.71	21.375	21.125	20.625
Red Brass, 85%	51.54	51.48	51.83	55.60	22.250	22.000	21.500
Com. Bronze, 90%	52.98	52.92	53.27	56.79	23.000	22.750	22.250
Manganese Bronze	56.56-56.59	50.22-50.24	60.47	....	18.000	17.750	17.250
Muntz Metal	50.94	46.25	....	....	18.125	17.875	17.375
Naval Brass	52.86	45.67	59.17	57.02	18.000	17.750	17.250
Silicon Bronze	59.49	58.68	58.78	77.90	24.500	24.250	23.500
Nickel Silver, 10%	63.66	65.99	65.74	....	24.125	23.875	12.062
Phos. Bronze, A-5%	74.59	75.09	74.34	76.52	26.125	25.875	24.875

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 17.25-17.75; new brass clippings, 15.50-16.00; light brass, 12.50-13.00; heavy yellow brass, 13.50-14.00; new brass rod ends, 14.50-15.00; auto radiators, unsweated, 13.50-14.00; cocks and faucets, 15.50-16.00; brass pipe, 15.75-16.25.

Lead: Soft scrap lead, 7.00-7.50; battery plates, 2.75-3.00; linotype and stereotype, 8.00-8.50; electrotype, 7.50-8.00; mixed babbitt, 8.00-8.50.

Monel: Clippings, 27.00-28.00; old sheets, 24.00-25.00; turnings, 18.00-19.00; rods, 25.00-26.00.

Nickel: Sheets and clips, 53.00-55.00; rolled anodes, 53.00-55.00; turnings, 39.00-40.00; rod ends, 53.00-55.00.

Zinc: Old zinc, 2.50-2.75; new diecast scrap, 2.75-3.00; old diecast scrap, 1.00-1.50.

Aluminum: Old castings and sheets, 9.00-9.50; clean borings and turnings, 4.50-5.00; segregated low copper clips, 11.00-11.50; segregated high copper clips, 10.00-10.50; mixed low copper clips, 10.50-11.00; mixed high copper clips, 10.00-10.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 13.50-14.00; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.50-11.00; clean borings and turnings, 8.50-9.00; segregated low copper clips, 14.00; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 55.00; light scrap, 50.00; turnings and borings, 35.00.

Copper and Brass: No. 1 heavy copper and wire, 25.00; No. 2 heavy copper and wire, 23.50; light copper, 21.25; refinery brass (60% copper) dry copper content, 21.75.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 25.00; No. 2 heavy copper and wire, 23.50; light copper, 20.75; No. 1 composition borings, 20.00-21.50; No. 1 composition solids, 21.00-22.00; heavy yellow brass solids, 16.00-17.00; yellow brass turnings, 14.00-16.00; radiators, 16.75-17.25.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 46.04; oval, 42.50; electrodeposited, 38.00; cast, 40.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 120.50; 200-499 lb, 119.00; 500-999 lb, 118.50; 1000 lb or more, 118.00.

Zinc: Balls, 18.75; flat tops, 18.75; flats 21.50; ovals, 20.75, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.00; 2000-5900 lb, 13.00; 6000-11,900 lb, 12.75; 12,000-22,900 lb, 12.50; 23,000 lb or more, 12.00.

Nickel-Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 500-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 2000 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 79.50; 100-600 lb, 70.20; 700-1900 lb, 67.40; 2000-9900 lb, 65.60; 10,000 lb or more, 64.20.

Stannous Chloride (Anhydrous): 25 lb, 155.00; 100 lb, 150.10; 400 lb, 147.70; 800-19,900 lb, 106.80; 20,000 lb or more, 100.70.

Stannous Sulphate: Less than 50 lb, 140.20; 50 lb, 110.20; 100-1900 lb, 108.20; 2000 lb or more, 106.20.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 113*)

Chalmers Mfg. Co., Milwaukee, says gross farm income this year will at least equal that in 1960, and granted reasonable weather, farmers should return to normal farm equipment purchase patterns with dealers bringing their inventories up to the usual levels. He thinks that highway construction should be greater in 1961 than in 1960, and this should stimulate construction machinery buying. He says dealers will need to carry larger floor stocks.

W. A. Hewitt, president, Deere & Co., Moline, Ill., says tractor sales increased substantially in the first quarter this year, reflecting excellent acceptance of the company's new line of four and six cylinder models. However, sales of other types of equipment were less than during the corresponding 1960 period. Based upon retail sales by dealers during the year to date, Deere & Co. continues to expect a marked improvement in total sales in 1960, and production schedules have been set accordingly.

William J. Grede, president, J. I. Case Co., Racine, Wis., says the company's dealers and most farm economists anticipate that purchases by farmers will hold up well this year, and will help agricultural tractor and equipment sales. Construction work, on the other hand, is down considerably and the company's industrial sales have been affected adversely. Some improvement is anticipated as the year advances.

Structural Shapes . . .

Structural Shape Prices, Page 102

Fabricators are anticipating a spring surge in demand, with prospects for 1961 building activities increasingly promising. Mill orders for structurals are reported creeping up slowly, but most of the larger fabricators have considerable work on planning boards and will be entering the market shortly for shapes.

Inquiry is definitely more active in the East than it was two or three weeks ago, and it is fairly diversified. In addition to highway work, there is increasing inquiry for private construction, including some industrial work. Considerable school, church, office building, and shopping center work is pending.

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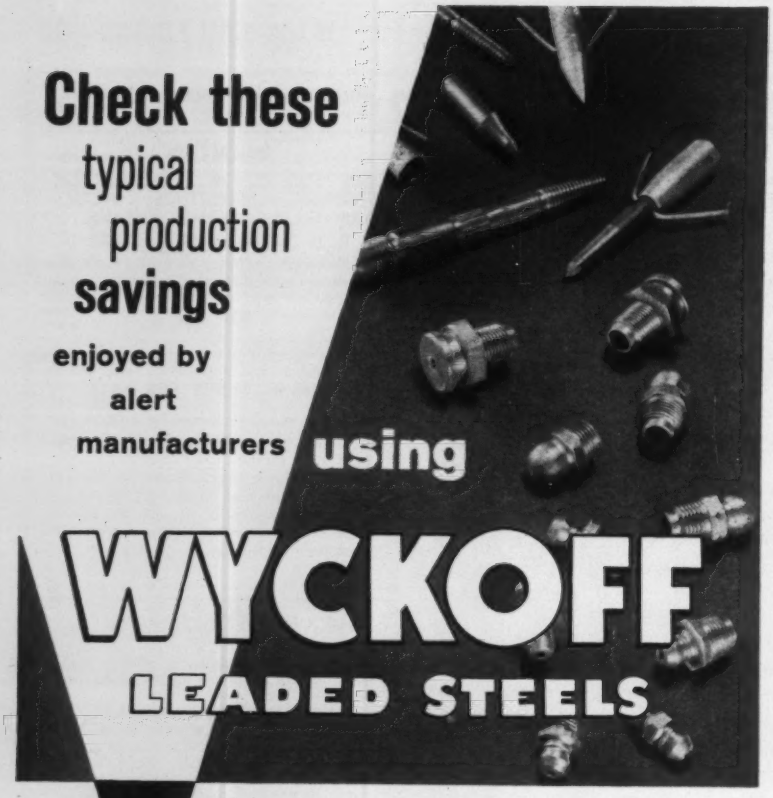

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STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

41,000 tons, Tagus River suspension bridge, Lisbon, Portugal; contract signed by U. S. Steel Export Co. and the Portuguese government. The steel will be fabricated by the American Bridge Div., U. S. Steel Corp.; provisional award was made May 28, 1960. The bridge will rank as Europe's longest clear span bridge, and the fifth largest in the world.

8185 tons, powerhouse, Widow's Creek Steam Plant, Tennessee Valley Authority, Alabama, to American Bridge Div., U. S. Steel Corp., Pittsburgh.

4500 tons, extension, Fisher Body plant, Tarrytown, N. Y., to Grand Iron Works, New York.

2764 tons, erecting only, six bridges, Chicago, Rock Island & Pacific Railroad, Blue Island, Ill.; fabricated structural steel supplied by railroad; bids Mar. 16.

950 tons, retail store, LaSalle & Koch, Toledo, Ohio, to Mississippi Valley Structural Steel Co., Chicago.

800 tons, lamp manufacturing building, Lamp Works, General Electric Co., Euclid, Ohio, to Mississippi Valley Structural Steel Co., Chicago.

631 tons, bridge, Route 42A, 95th St. and Harlem Ave., Chicago, for Cook County, Ill., to Vierling Steel Works, Chicago.

518 tons, heating and refrigeration plant, O'Hare Airport, for City of Chicago, to Mississippi Valley Structural Steel Co., Chicago.

403 tons, bridge, 84-2-VF over Route 66 and Gulf, Mobile & Ohio Railroad, Sangamon County, Illinois, to Vierling Steel Works, Chicago.

300 tons, manufacturing building, Perlite Corp., division of Johns-Manville, Joliet, Ill., to Mississippi Valley Structural Steel Co., Chicago.

STRUCTURAL STEEL PENDING

7490 tons, state bridgework, Route 80, Sec. 5H, over Hackensack River, Bergen County, New Jersey; bids Mar. 16.

8500 tons, Chevrolet Assembly Plant, Tarrytown, N. Y.

5260 tons, transmission towers, Glen Canyon-Four Corners, Colorado River storage project, Coconino, Navajo, and Apache counties, Arizona, and San Juan County, New Mexico; bids Mar. 21, Bureau of Reclamation, Department of the Interior, Page, Ariz.

1752 tons, 11 bridge structures, Southington, Conn.; Angelo Tomasso Inc., New Britain, Conn., low on the general contract; also 1341 tons of concrete reinforcing bars, 185 tons of steel piling, and 560 tons of mat reinforcement for pavement.

1397 tons, two, 3 span continuous riveted plate girder bridges, and two, 3 span composite wide flange beam bridges, Richmond, Vt.; bids Mar. 17, Montpelier, Vt.; also, 310 tons of concrete reinforcing bars and 10,272 linear feet of steel piling.

1301 tons, state bridgework, FOWOBE 61-1, Nassau County, New York, Hendrickson Bros. Inc., New York, low on the general contract.

1224 tons, transmission line footings, involving 67 double circuit steel towers, 14.1 mile, government furnished; Tacoma-Grand Coulee transmission line; bids to Bonneville Power Administration, Portland, Oreg., Mar. 14.

911 tons, gooseneck bridge, over Shrewsbury River and approaches, Monmouth County, New Jersey; bids Mar. 16 to the State Highway Office, Trenton, N. J.; 310 tons of reinforcing steel are also required.

596 tons, trashracks, Glen Canyon Dam, Colorado River storage project, Arizona-Utah; bids Mar. 21, Bureau of Reclamation, Department of the Interior, Denver.

379 tons, state highway work, FARC 61-15, Westchester County, New York; bids closed Feb. 23.

370 tons, Washington State, Tilton River bridge, Lewis County; bids to Olympia, Wash., Mar. 14.

350 tons, also 160 tons of reinforcing, building, Century 21 Exposition, Seattle; Dahlgren Construction Co., Seattle, low at $552,000.

268 tons, state overpass, Route 22, Mountainside, N. J., Hess Bros. Inc., general contractor.

219 tons, one, 6 span composite wide flange beam bridge, Richmond-Williston, Vt.; bids Mar. 24, Montpelier; also, 140 tons of concrete reinforcing bars.

216 tons, state bridgework, FILME 61-1, New York County, New York, Pinebrook Construction Co., low bidder.

REINFORCING BARS . . .

REINFORCING BARS PLACED

975 tons, Washington State, Puyallup River freeway bridges, Pierce County; to J. D. English Steel Co., Tacoma, Wash.; Peter Kiewit Sons Co. Inc., Vancouver, Wash., general contractor.

516 tons, women's dormitory, Temple University, Philadelphia, through Stossflet & Tillotson, general contractor, to American Steel Engineering Co., Philadelphia.

225 tons, Washington State, two highway bridges, Yakima County, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Calabrese & Son, Mercer Island, Wash., general contractor at $271,410.

195 tons, Shilsole Bay administration building, Port of Seattle, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Absher Construction Co., Seattle, general contractor.

112 tons, gymnasium structure, Queen Anne High School, Seattle, to Soule Steel Co., Seattle; Century Construction Co., Seattle, general contractor at $489,200.

104 tons, Irving Schwartz Child Psychiatric Bldg., Philadelphia, to American Steel Engineering Co., Philadelphia.

REINFORCING BARS PENDING

4700 tons, also piling and welded steel pipe, Washington State freeway, Seattle section; bids to Olympia, Wash., Mar. 28.

310 tons, gooseneck bridge over Shrewsbury River and approaches, Monmouth County, New Jersey; bids to be opened by the State Highway Department, Trenton, N. J., Mar. 16; 911 tons of structural steel are also required.

230 tons, Idaho State, four concrete bridges, Birmingham County; Earl L. McNutt Co., Boise, Idaho, low at $1,441,134.

250 tons, Seattle Century 21 Exposition monorail, Howard S. Wright Construction Co., Seattle, subcontractor; general contract to Alweg Rapid Transit System at $1,571,000.

235 tons, Washington State highway span, Lewis County; bids to Olympia, Wash., Mar. 14.

131 tons, state bridgework, LR 141 (14), Berks County, Pennsylvania; bids Mar. 3.

105 tons, addition, law school, University of Pennsylvania, Philadelphia, Wark & Co., Philadelphia, low on the general contract.

PLATES . . .

PLATES PLACED

1810 tons, including 135 tons of high tensile, Navy Purchasing Office, Washington, to Phoenix Steel Corp., Claymont, Del.

387 tons, hull plate, Military Industrial Supply Agency, Navy, Philadelphia, to Phoenix Steel Corp., Claymont, Del.; 85 tons to U. S. Steel Corp., Pittsburgh.

PLATES PENDING

1000 tons (if welded steel pipe is accepted); 6 miles of 20 and 24 in. water supply line, Port Angeles, Wash.; plates underbid by concrete cylinder pipe by Harbert Construction Co., Tacoma, Wash., at $943,823.

PIPE . . .

CAST IRON PIPE PLACED

488 tons, 4, 6, and 8 in., for Seattle project, to Pacific States Cast Iron Pipe Co., Seattle.

300 tons or more, 6 to 12 in., for Vancouver, Wash., to unstated interest.

182 tons, 4 to 8 in., for Seattle, to U. S. Pipe & Foundry Co., Seattle.

CAST IRON PIPE PENDING

488 tons, 4, 6, and 8 in.; bids to Seattle, Wash., Feb. 14.

454 tons, 12 and 16 in.; bids to Alderwood Manor, Wash., Mar. 13.

208 tons, 6 and 10 in.; bids to Port Orchard, Wash., Mar. 8.

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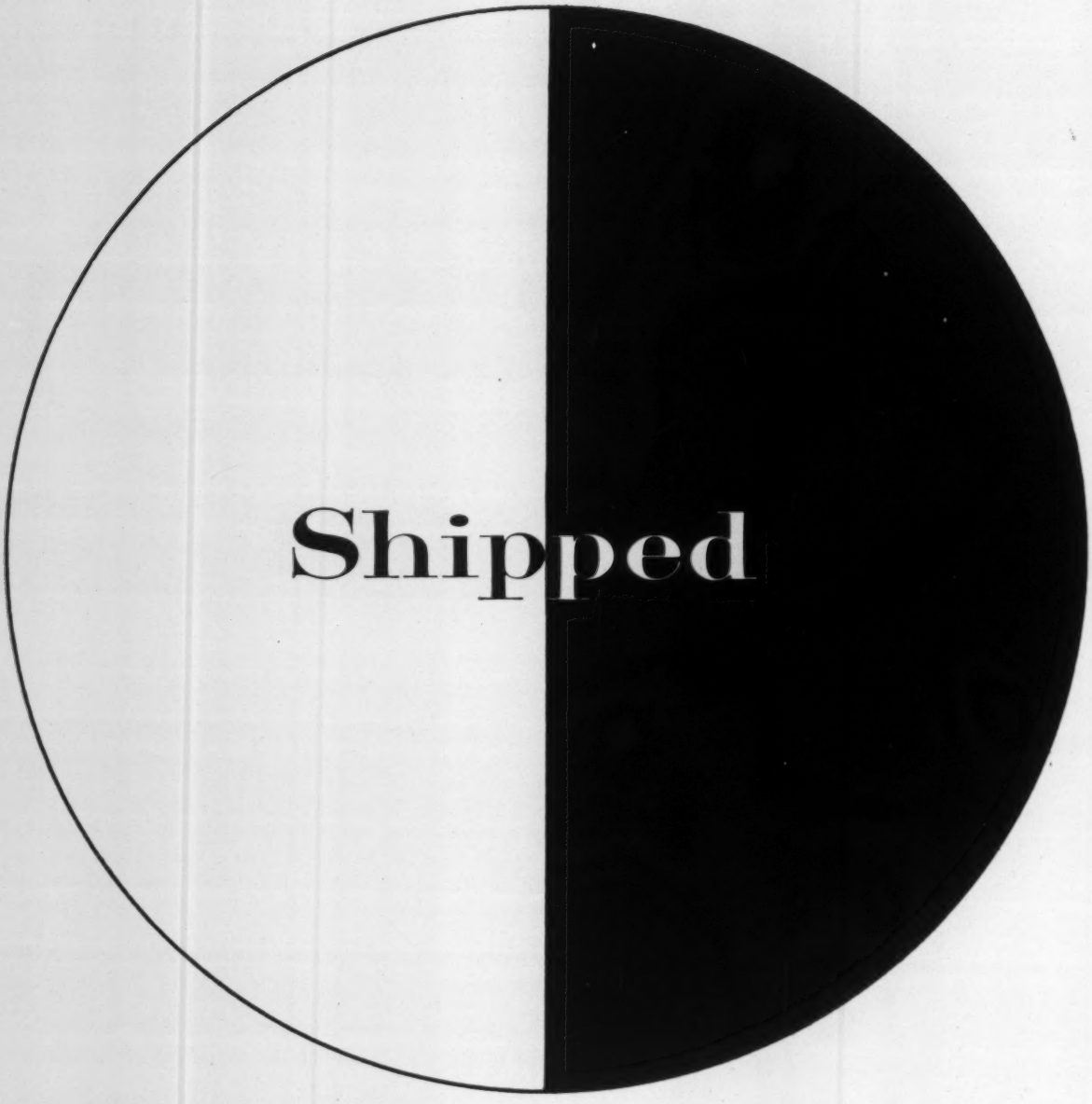

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